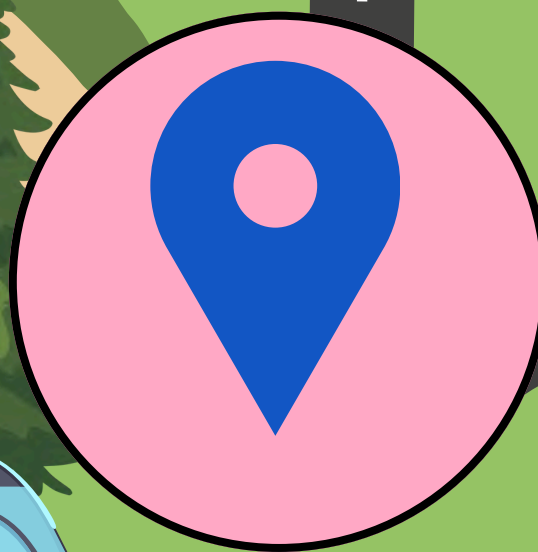




Teacher's Pet



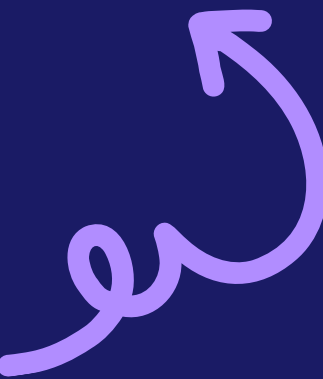
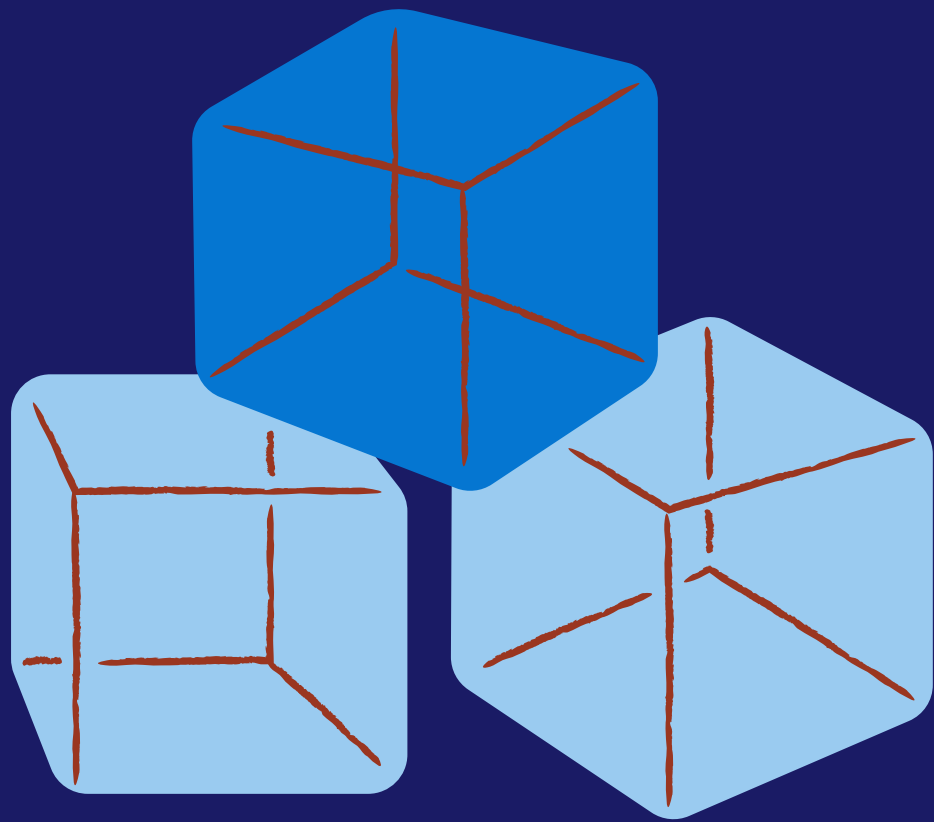
Particle Model  
of Matter





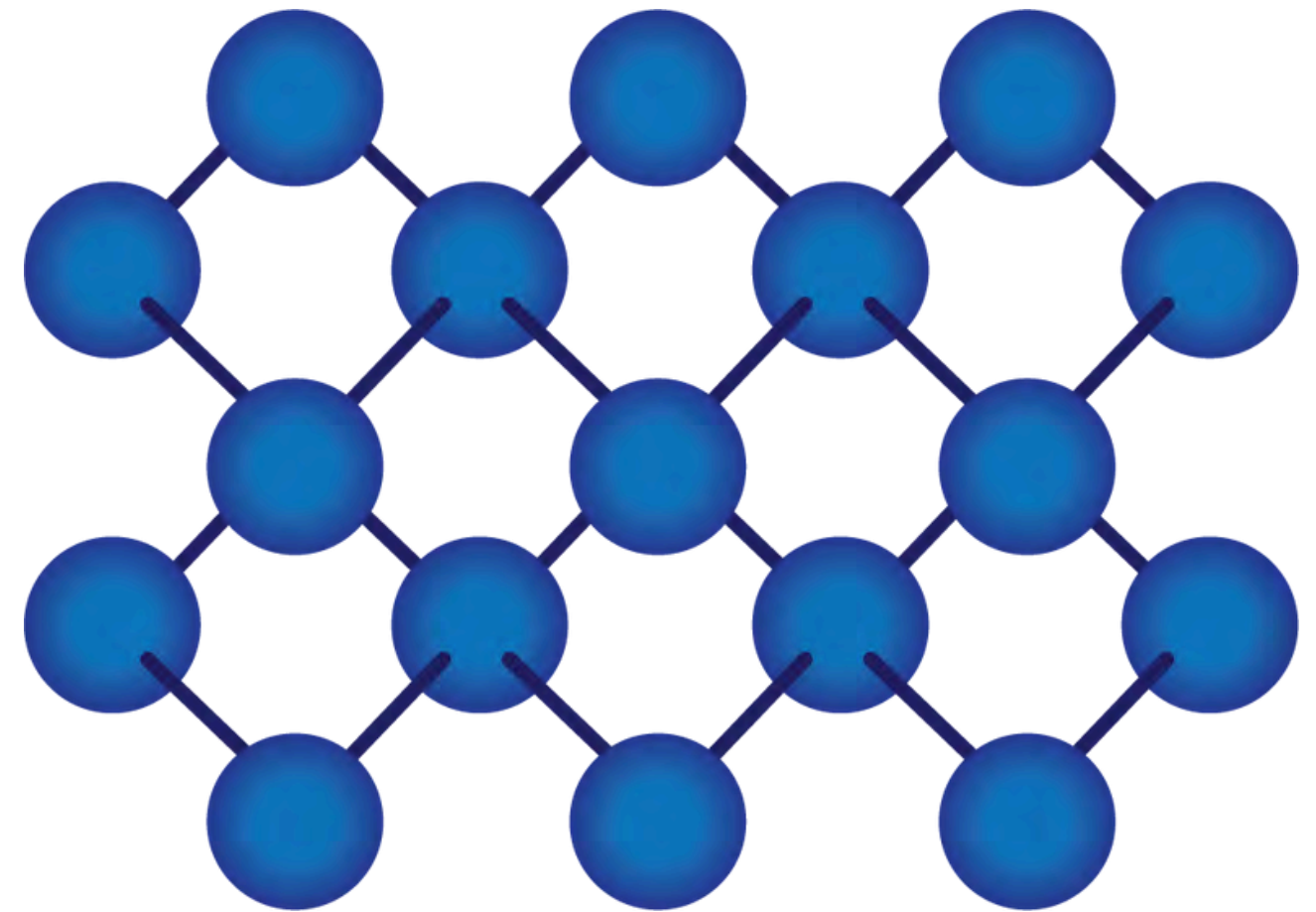
# Mapping Out Matter

## Solids, Liquids & Gases



# PROPERTIES OF A SOLID

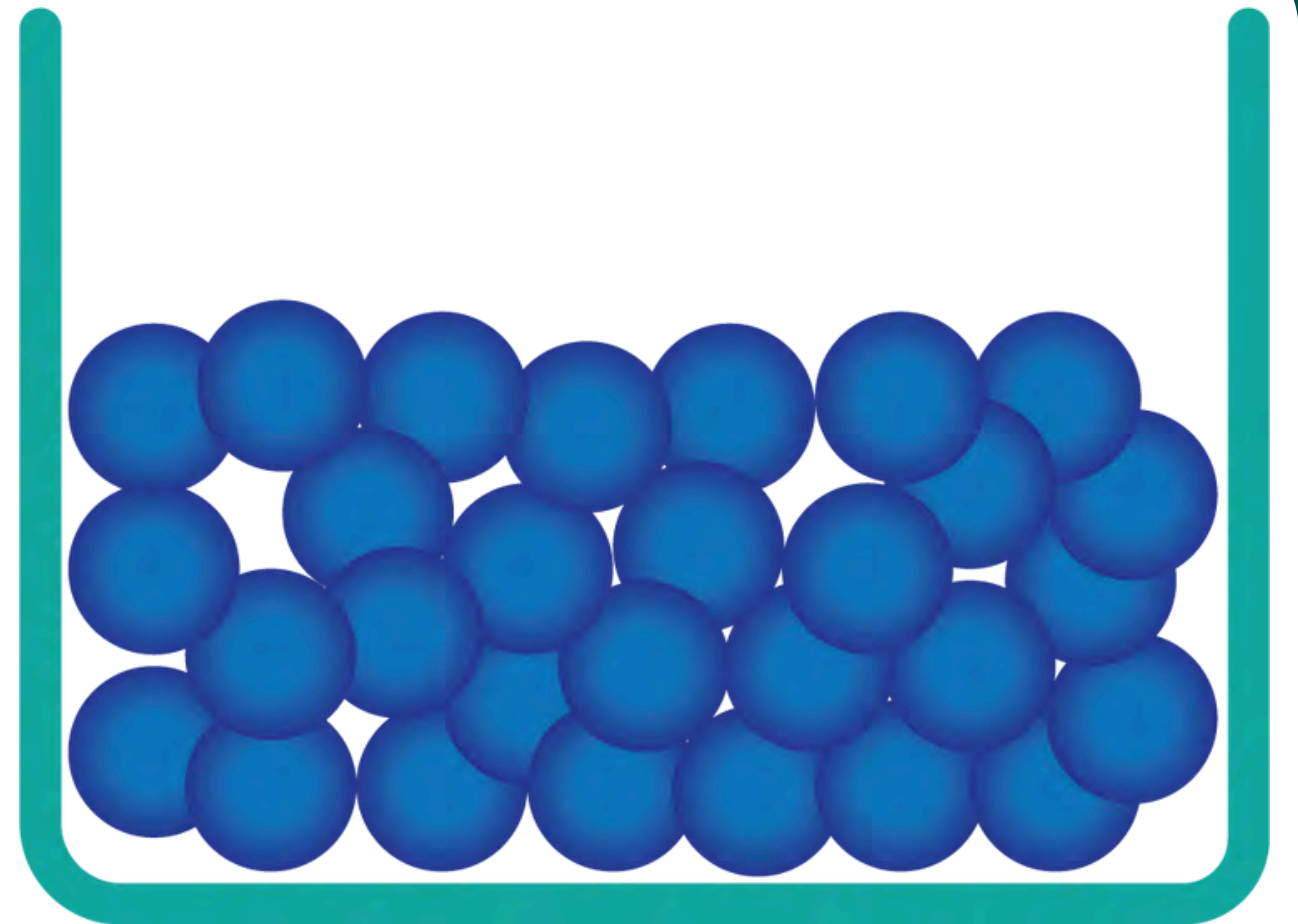
- definite shape
- definite volume
- particles tightly packed in a regular arrangement
- rigid



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

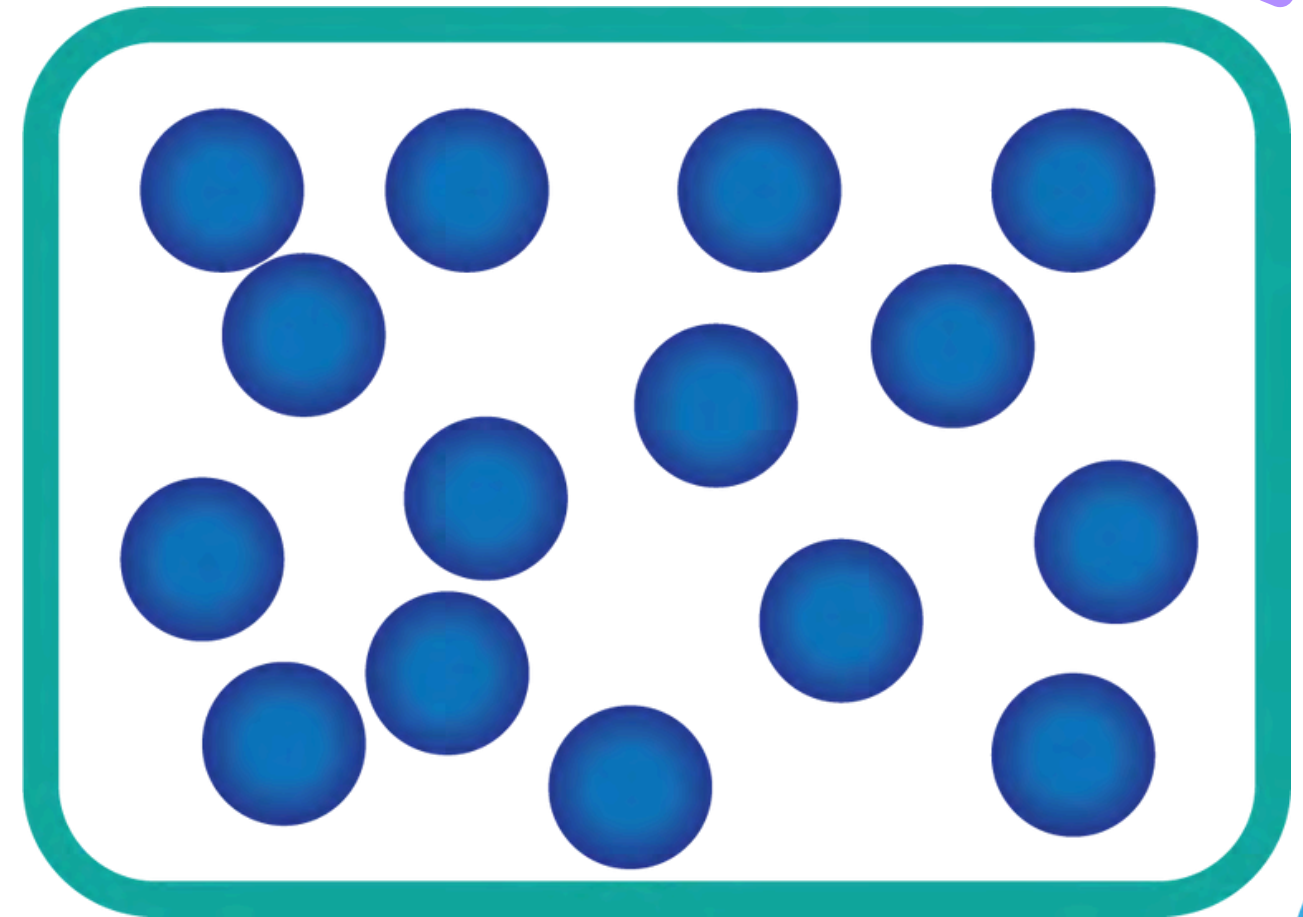


Volume is the amount of space an object occupies. A liquid takes up the same space even when you transfer it to another container.



# 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?

|                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Mystery Item #1</b> </p> <ul style="list-style-type: none"><li>• 7Lg</li><li>• Denser than water</li><li>• Not compressible</li></ul>                  | <p><b>Mystery Item #2</b></p> <ul style="list-style-type: none"><li>• 500mL</li><li>• Denser than water</li><li>• Compressible</li></ul>                    | <p><b>Mystery Item #3</b> </p> <ul style="list-style-type: none"><li>• 175mL</li><li>• Denser than water</li><li>• Compressible</li></ul>      |
| <p> <b>Mystery Item #4</b></p> <ul style="list-style-type: none"><li>• 205g</li><li>• 199mL</li><li>• Denser than water</li><li>• Not compressible</li></ul> | <p><b>Mystery Item #5</b></p> <ul style="list-style-type: none"><li>• 21g</li><li>• 25mL</li><li>• Denser than water</li><li>• Not compressible</li></ul>  | <p><b>Mystery Item #6</b> </p> <ul style="list-style-type: none"><li>• 196g</li><li>• Less dense than water</li><li>• Compressible</li></ul> |

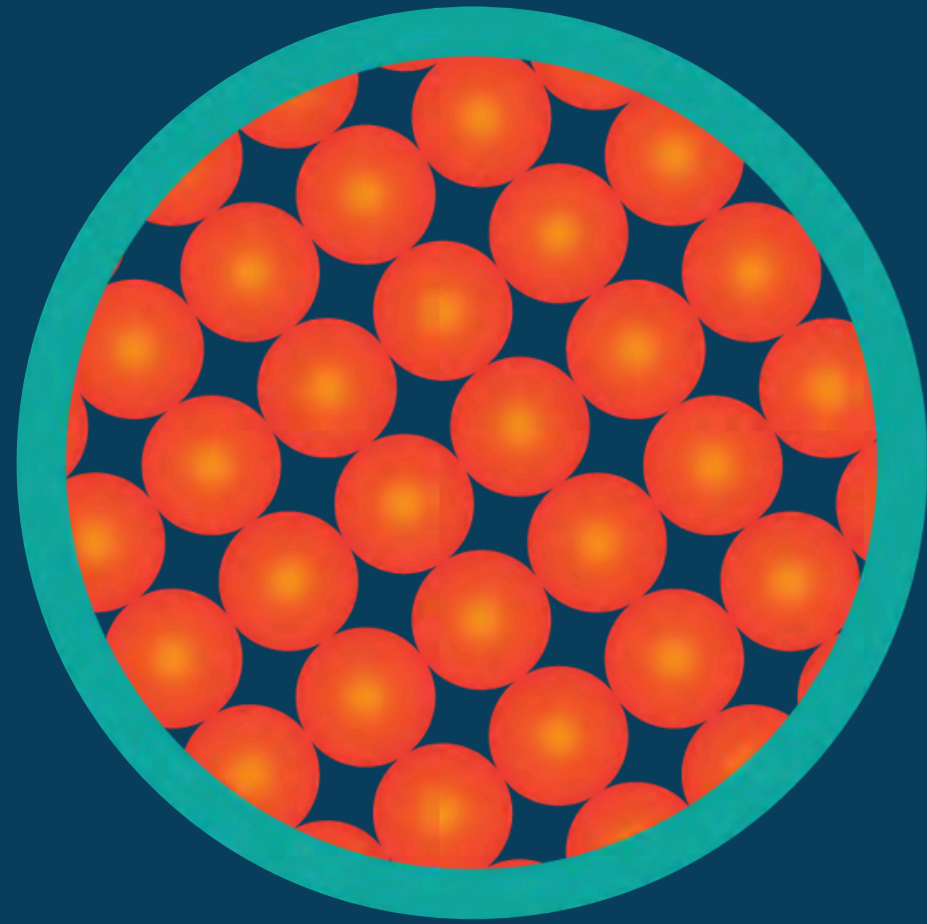


# Particle Model of Matter

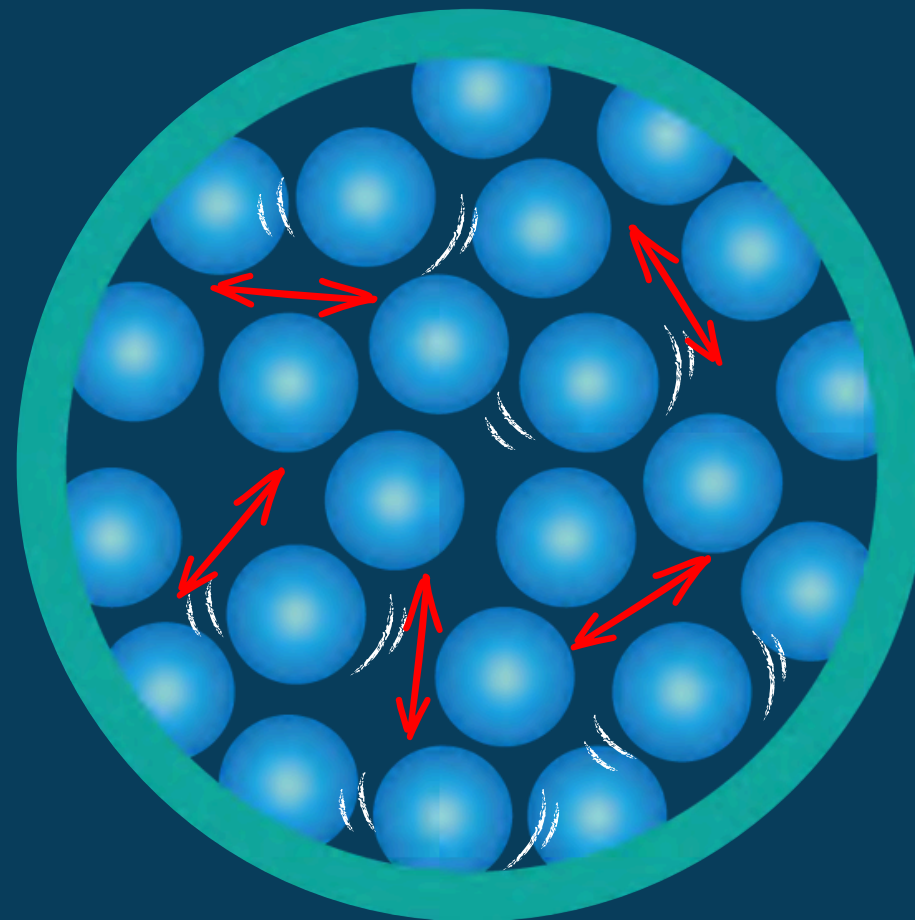
Solid

Liquid

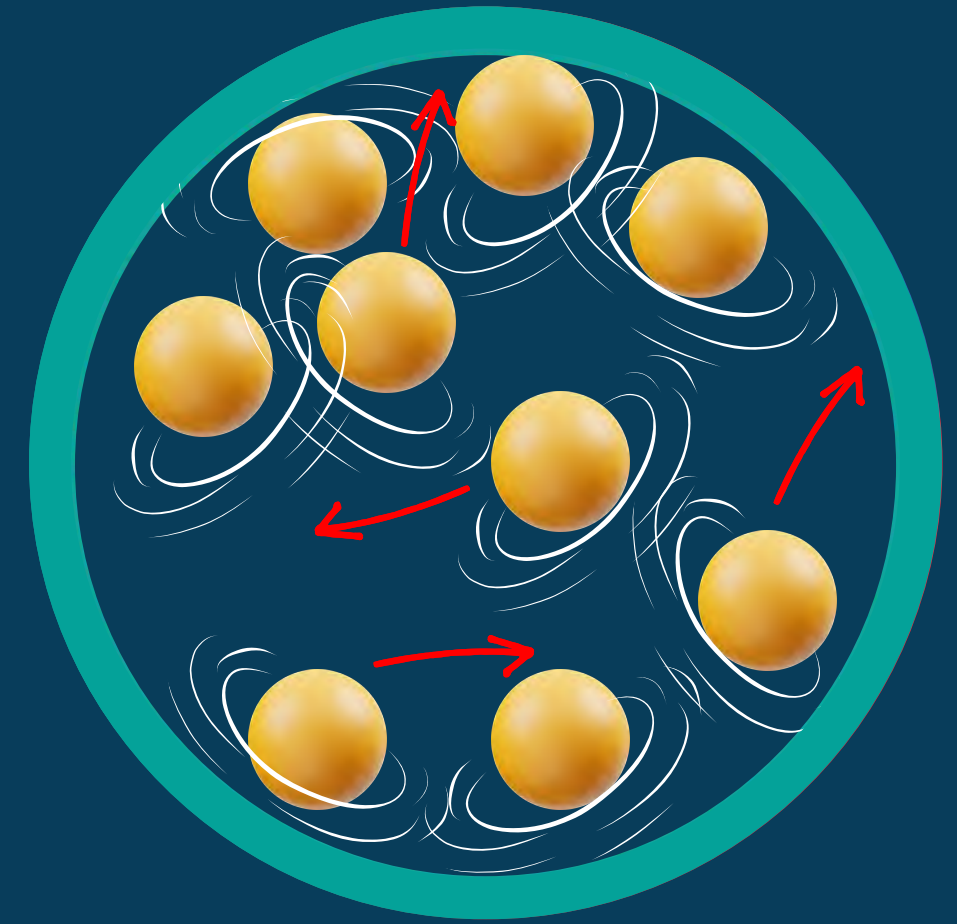
Gas



Particles are close together and vibrate in place.



Particles are separated by some space and can slide past each other.



Particles are separated by lots of space and are constantly moving in all directions.



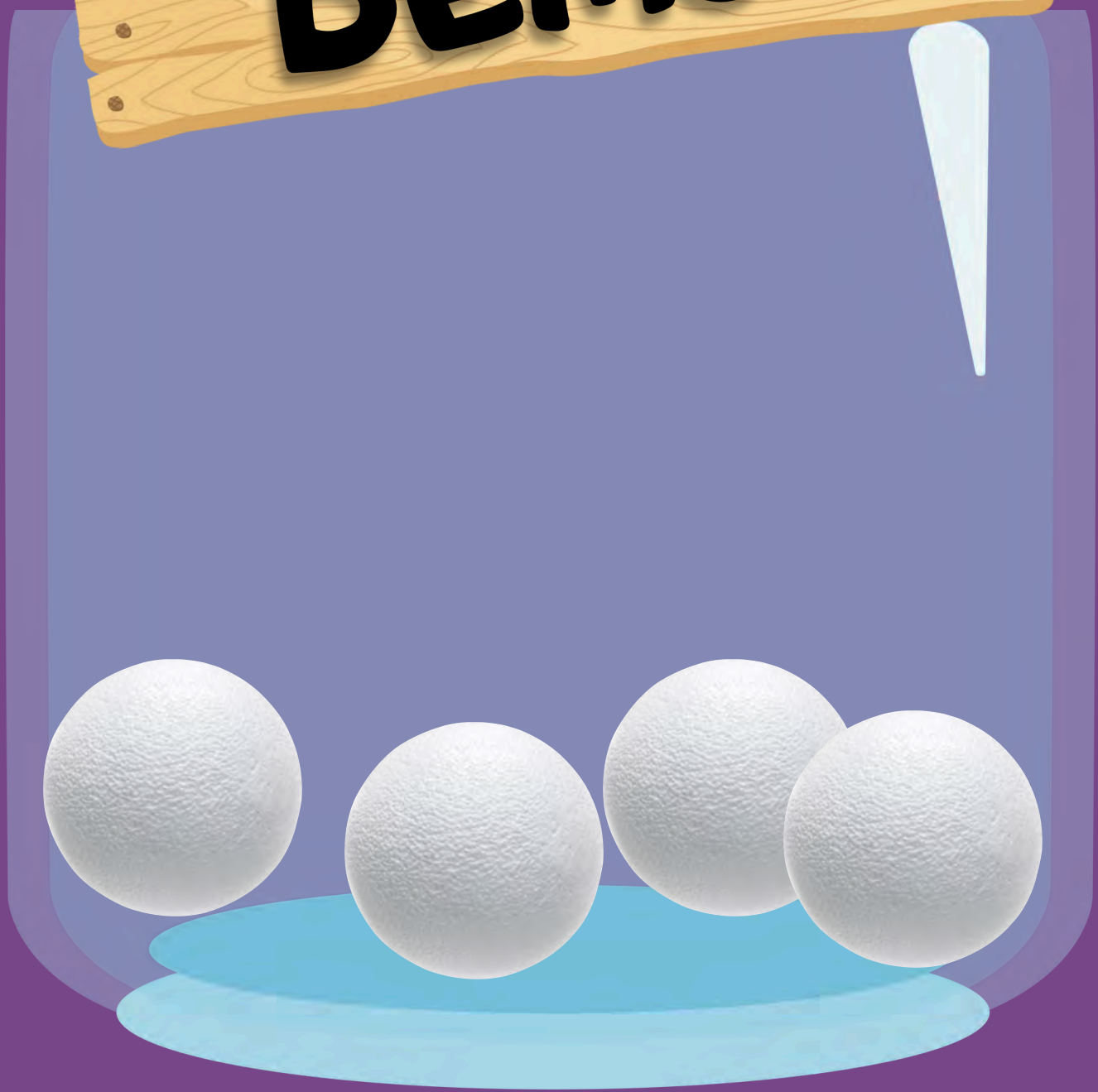
Hit the Road!





STYROFOAM BALL

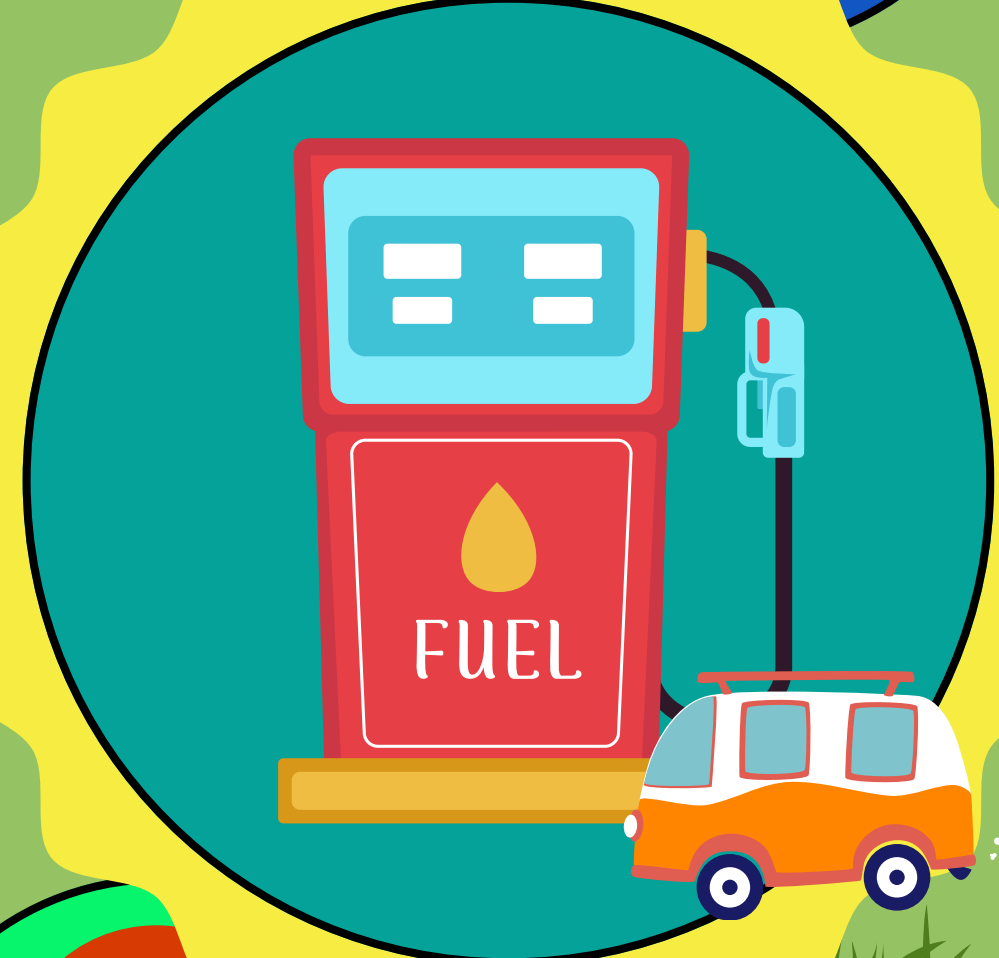
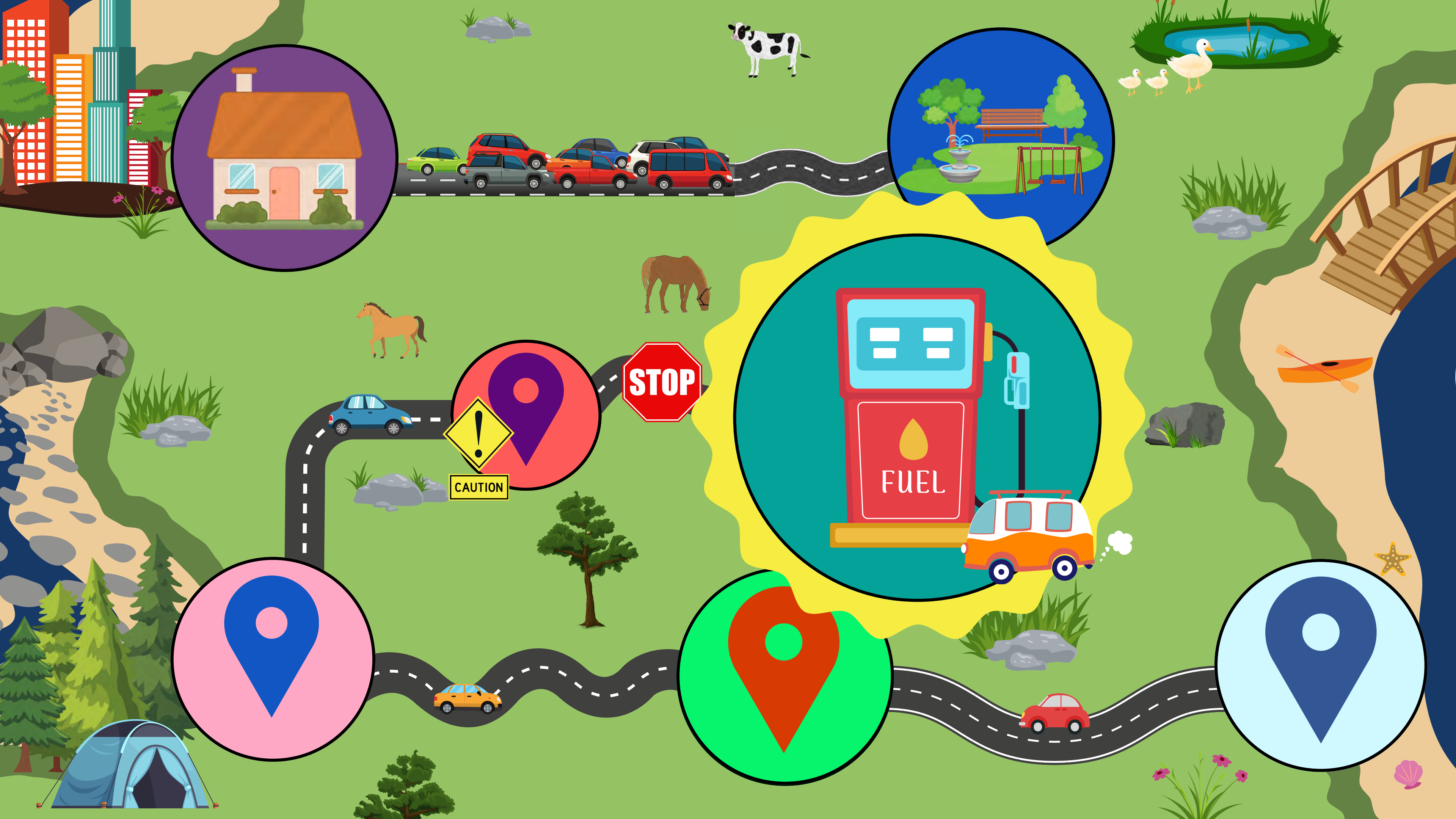
DEMO



STYROFOAM BALL

DEMO



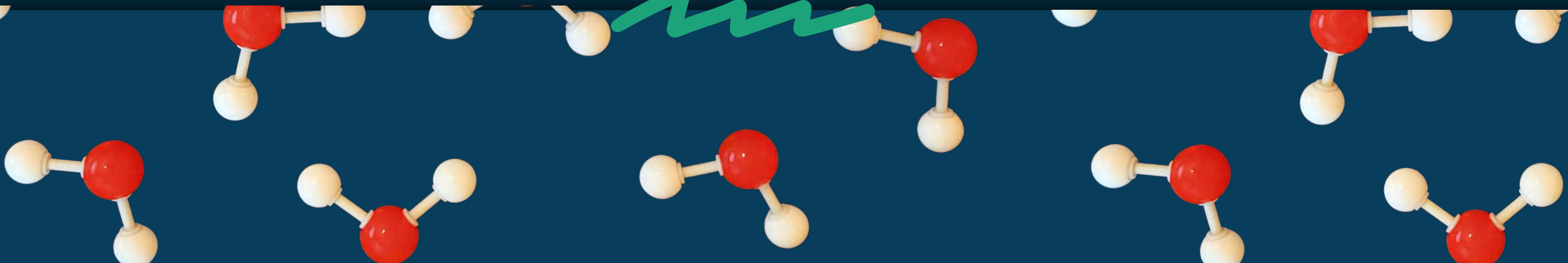
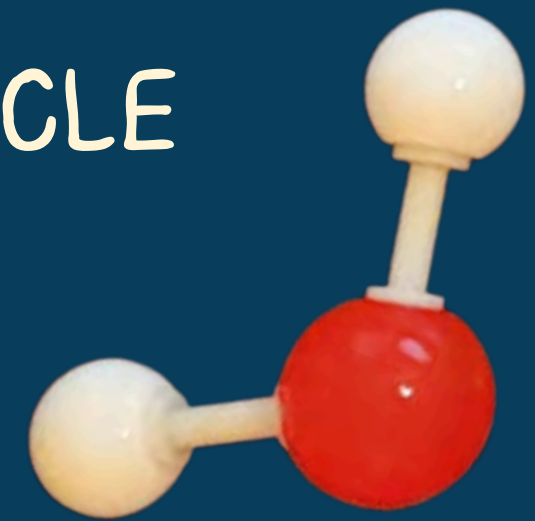


# Building Solids, Liquids & Gases

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?

## Mystery Check Stop #1

Clues:

- ① My particles slide past 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?

## Mystery Check Stop #2

Clues:

- ① My particles are separated 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 separated 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.





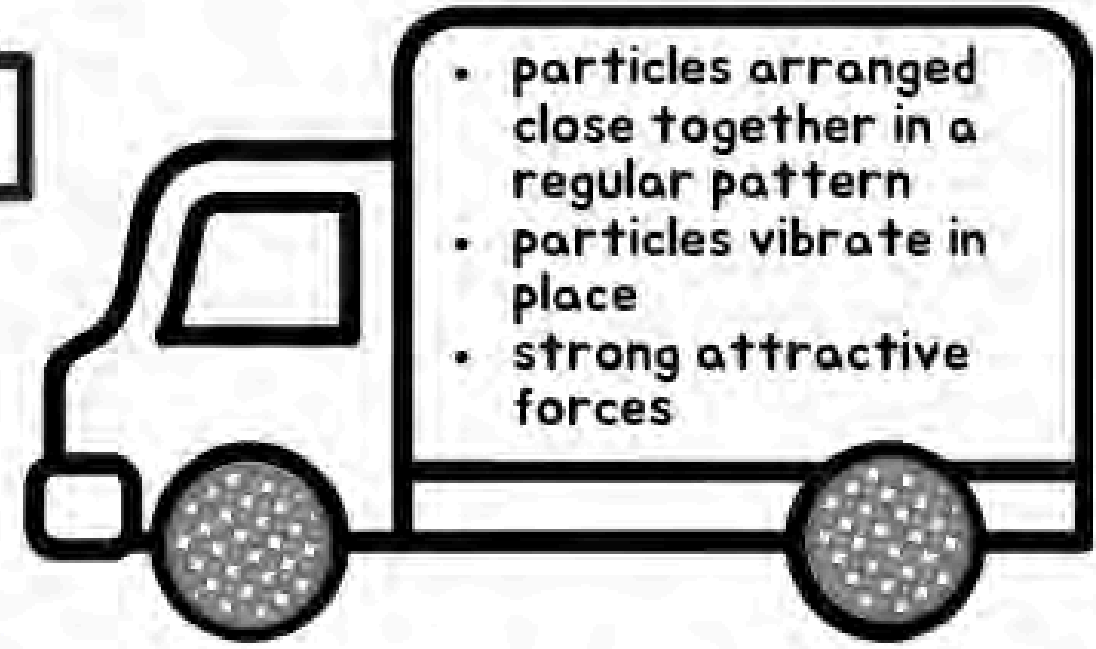
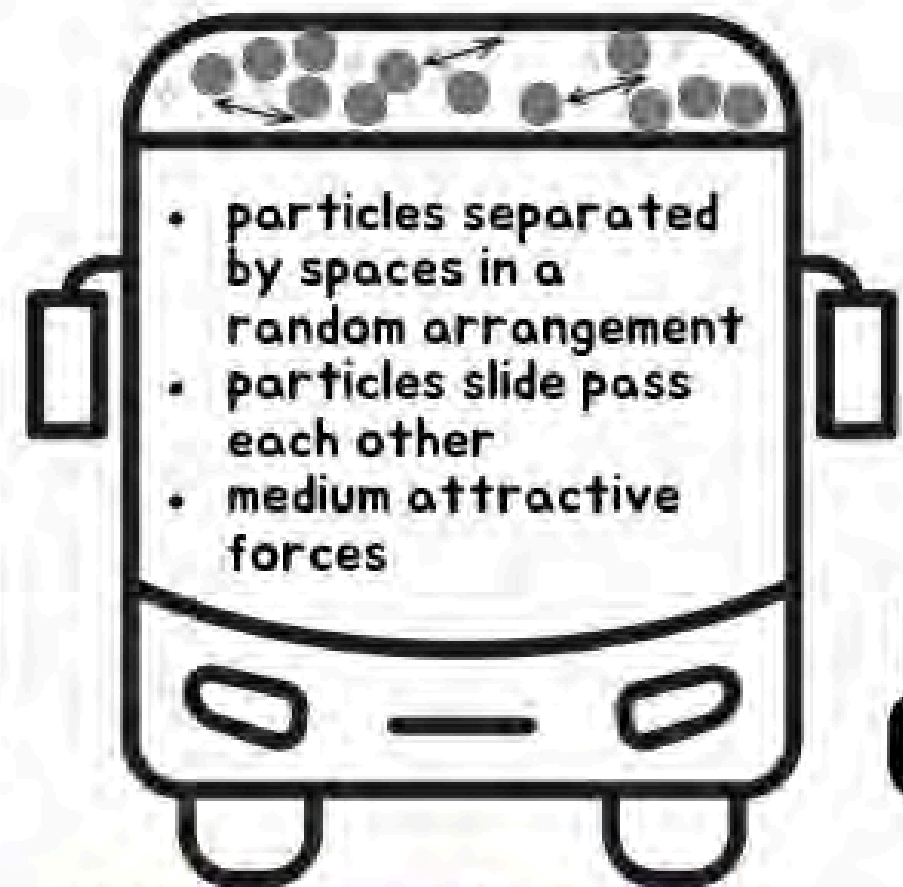
# Particle Model of Matter Solid, Liquid, and Gas

Draw lines to match the state of matter to the properties below.

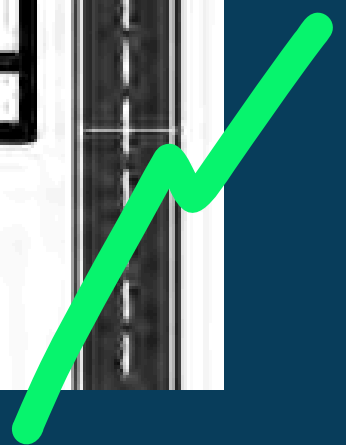
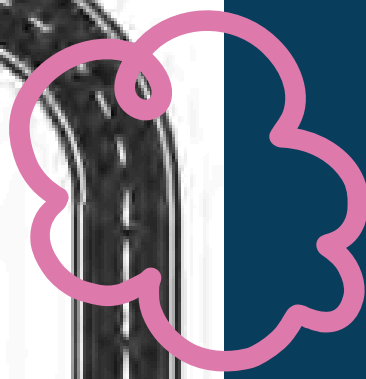
## Solid

## Liquid

## Gas

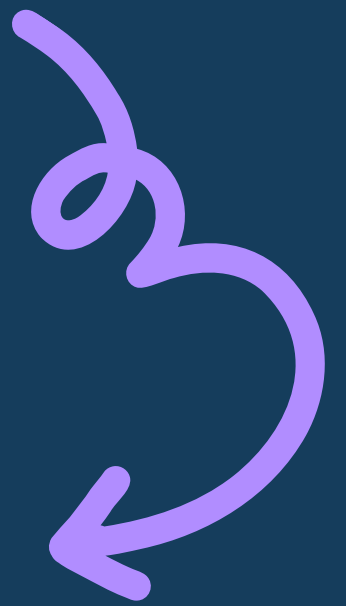
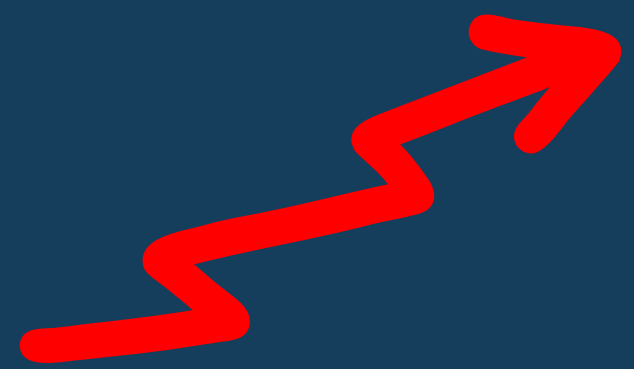


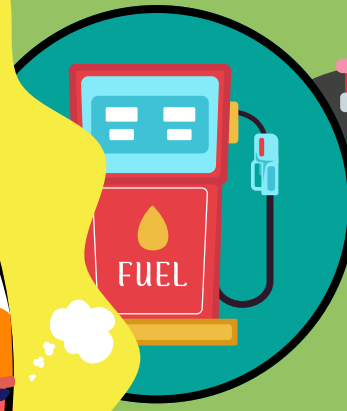
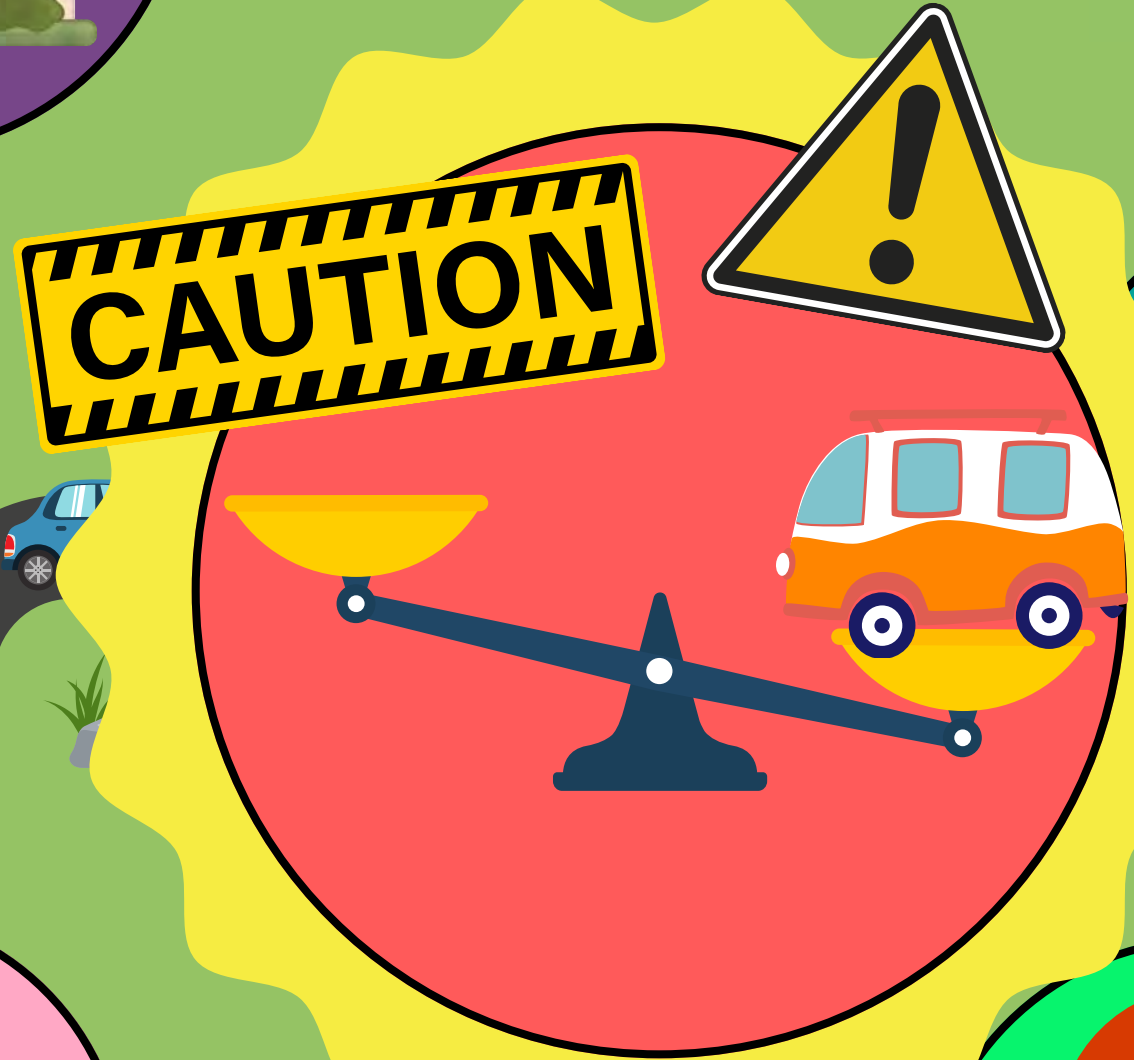
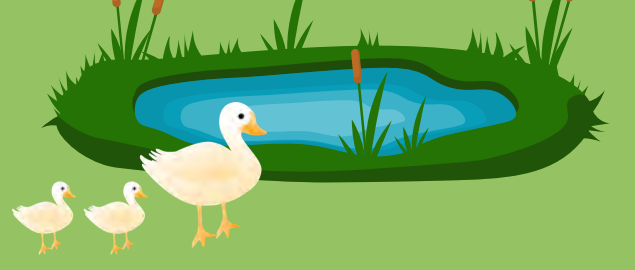
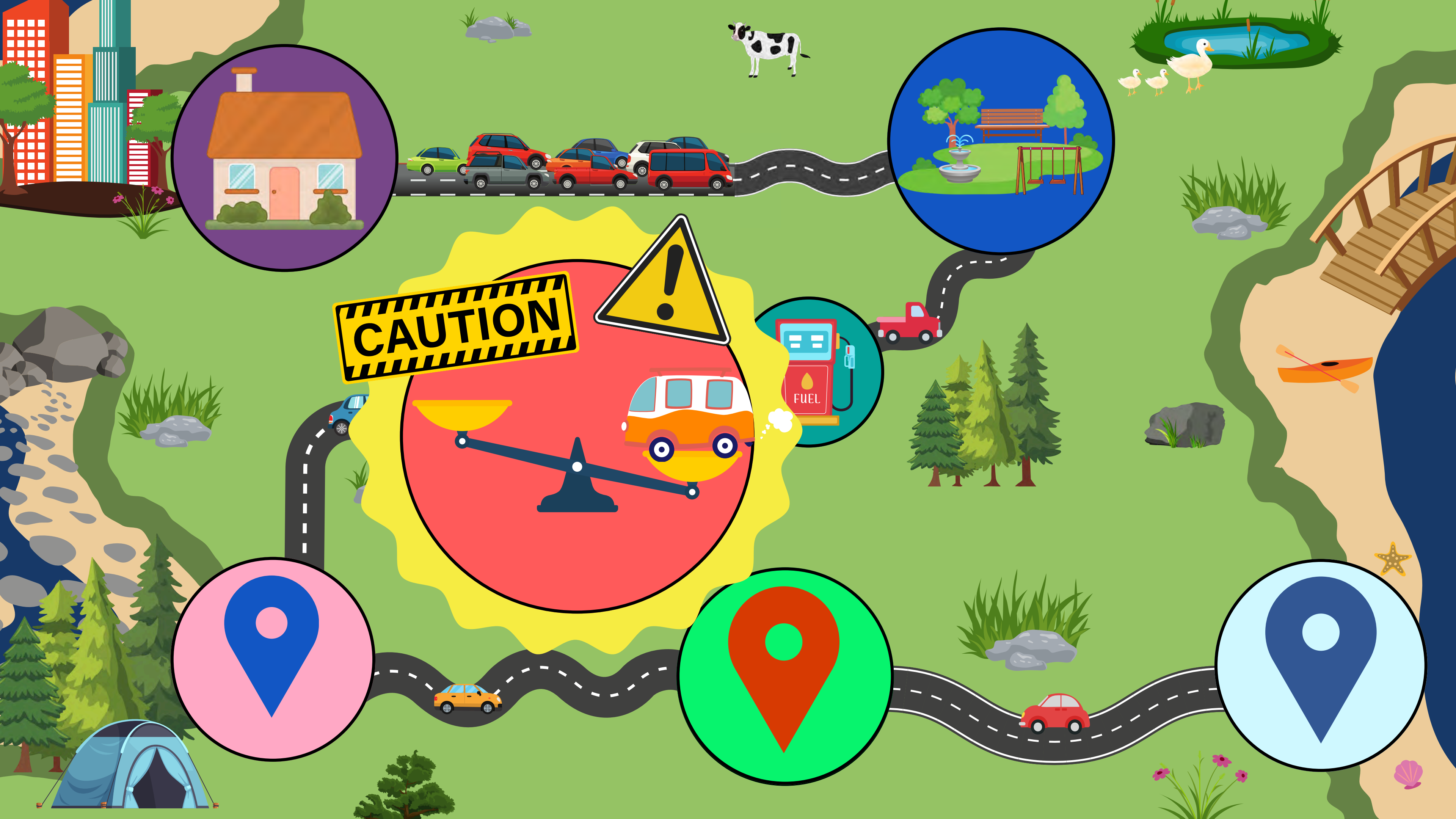
Teacher's Pet



PARTICLE

DEMO





# 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

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

- always the same and never changes

# V

# Weight

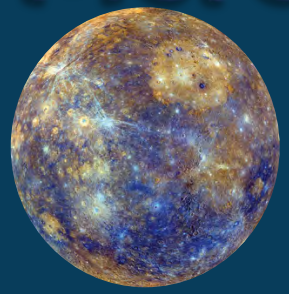
- is the force of gravity on an object

# S

- changes depending on how much gravity is acting on the object



Mercury

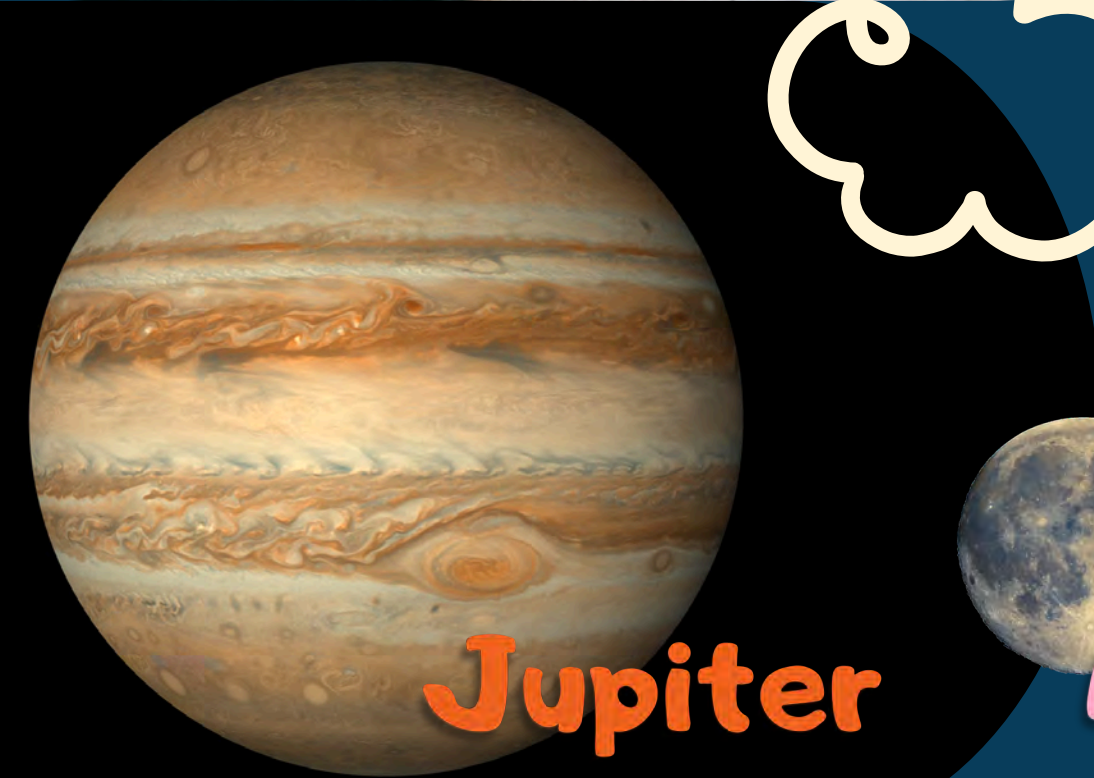


# Mass vs Weight

| Planet  | Force of Gravity       | Mass  | Weight  |
|---------|------------------------|-------|---------|
| Earth   | 9.81 m/s <sup>2</sup>  | 34 kg | 34 kg   |
| Mercury | 3.7 m/s <sup>2</sup>   | 34 kg | 12.9 kg |
| Jupiter | 24.79 m/s <sup>2</sup> | 34 kg | 86 kg   |
| Moon    | 1.62 m/s <sup>2</sup>  | 34 kg | 5.6 kg  |



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



Jupiter



Moon

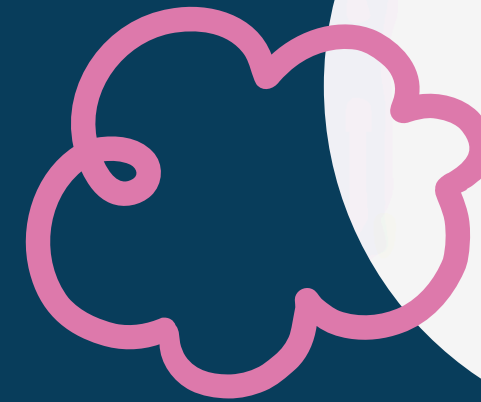


# Types of Scales



Bathroom Scale

Digital scale  
(Kitchen/Scientific)



Spring Scale



Balance Scale



Grocery Store Scale



Baby Scale



Slide Scale

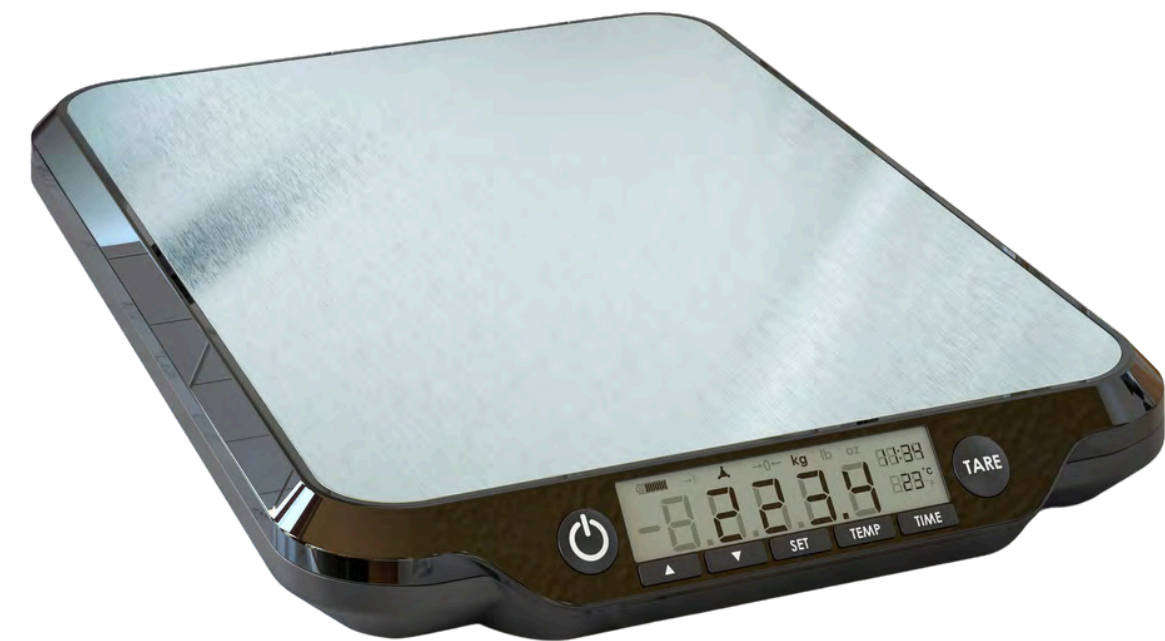
# Balance Scale



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.



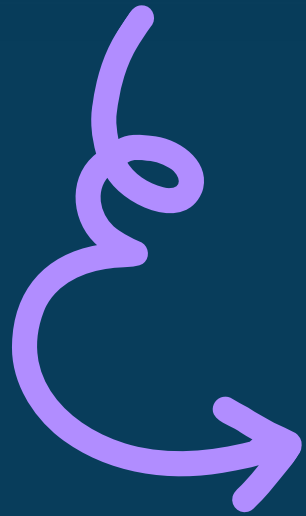
# Instructions for Mass

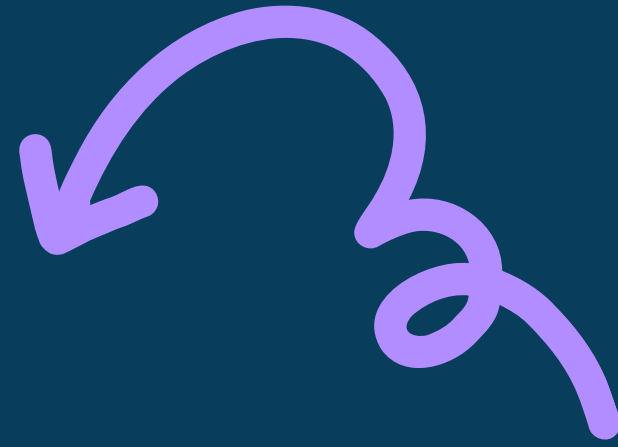
1. Line up the items on your desk to predict how much each weighs from lightest to heaviest.
2. Using either a digital or balance scale weigh the mass of each solid and liquid.
3. Record it in the table on your worksheet.
4. Switch your scale with another table group so you can try the other type of scale.
5. Measure the mass of each solid and liquid again and record it in the table on your worksheet.

**Mass**

Place each item on the two types of scales. Record the mass in the chart below.

| Item          | Mass on Balance Scale (g) | Mass on Digital Scale (g) |
|---------------|---------------------------|---------------------------|
| Deck of cards |                           |                           |
| Golf Ball     |                           |                           |
| Toy Car       |                           |                           |
| Water         |                           |                           |
| Dish Soap     |                           |                           |
| Oil           |                           |                           |



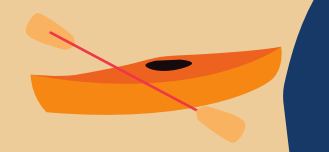
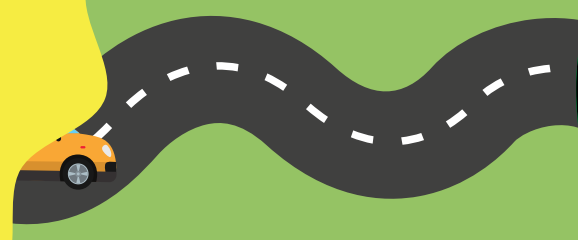
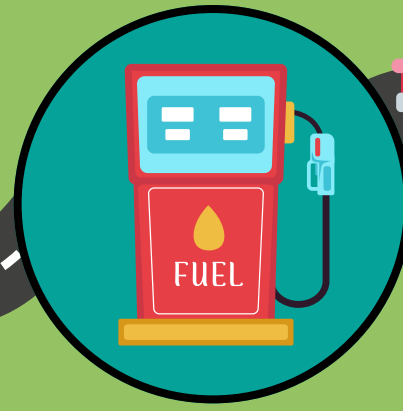
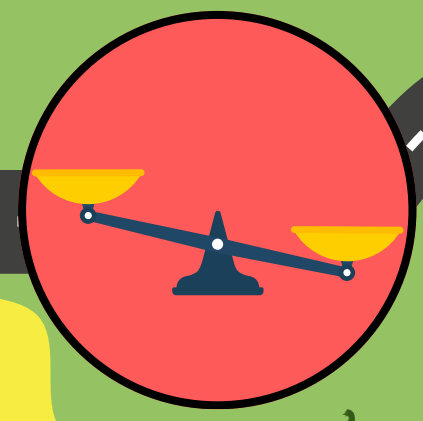
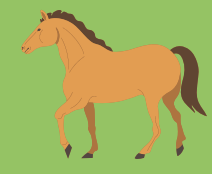
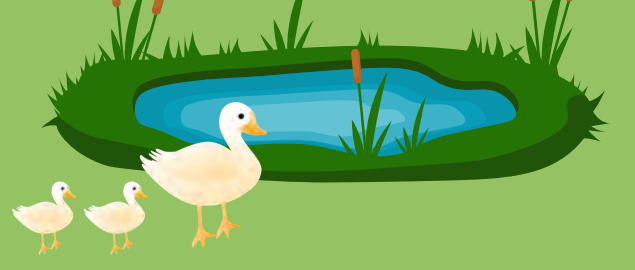


# Mystery Item Clue #1

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.







# 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

1. Determine the volume of each flavour your group would like.
2. Record the volume and flavour/colour on your worksheet.
3. Be mindful of the container sizes. No flavour can be more than 150mL.
4. Figure out which flavour goes in which container and match them all up.
5. Pour the correct volume of each flavour into the container you have chosen.
6. Colour if you have extra time.



## Beaker Sizes



**Volume**

How much of each flavour do you want in your slushie?

Write the flavour and volume chosen under each container.

Draw a fill line to show approximately how much liquid you need to fill in each container.

**Flavour Options**

- Cherry (red)
- Blue Raspberry (blue)
- Mango (yellow)
- Grape (purple)
- Lime (green)

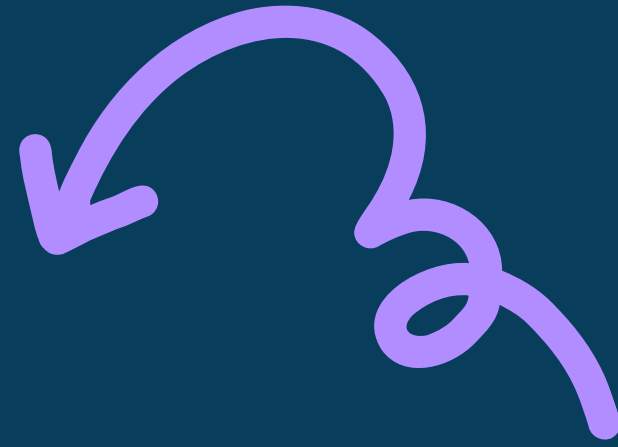
**Volume Options**

- 15 mL
- 25 mL
- 40 mL
- 75 mL
- 125 mL

**Beaker Size:** 15mL, 30mL, 50mL, 100mL, 150mL

**Flavour Choice:** \_\_\_\_\_

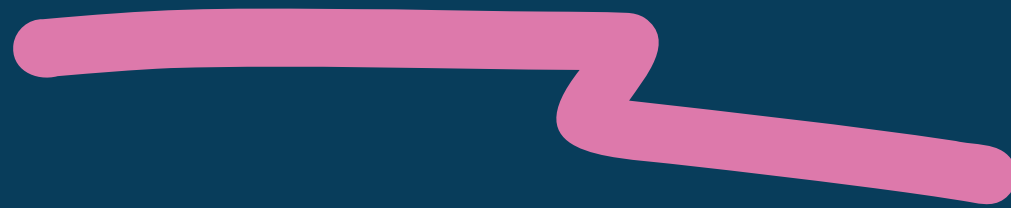
**Volume Choice:** \_\_\_\_\_



## Mystery Item Clue #2

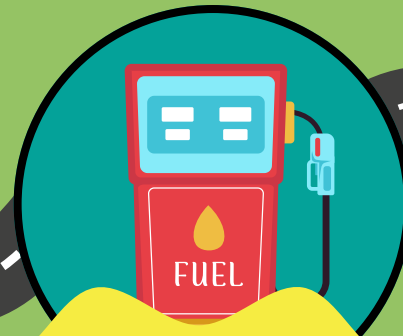
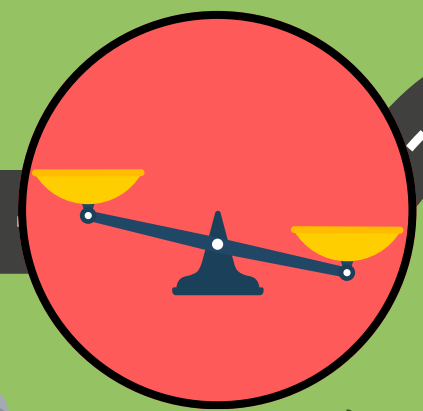
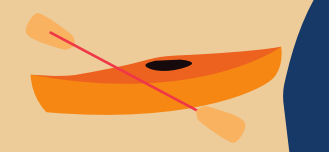
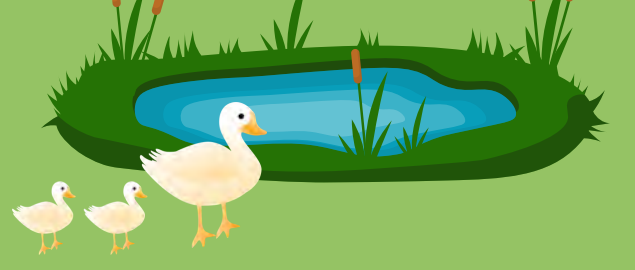
The volume of the mystery item is between **190mL** and **600mL**.

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





**TRAFFIC JAM  
MOVEMENT BREAK**



# 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 Container Instructions

1. Fill each container with different sized pompoms until to the top.
2. Hold the containers and predict which is the most dense and which is less dense.
3. Measure the mass of each container using the digital scales at the front of the classroom. Record it on your worksheet.
4. Record which was the most/least dense. Was your prediction correct?



**Density**

Sort the pompoms by size into the different containers.  
Weigh the containers and fill in the following table based on your results.

| Material in Container | Mass (g) | Number of Pompoms* |
|-----------------------|----------|--------------------|
| Small Pompoms         |          |                    |
| Medium pom poms       |          |                    |
| Large pompoms         |          |                    |
| X-large pompoms       |          |                    |

\*if you have time, count the number of pompoms in each container\*

Circle the least dense container. Put a square around the densest container.

Small container      Med container      Large container      XL container

\*count the pompoms if you have time



POP CAN

DEMO



## Float or Sink

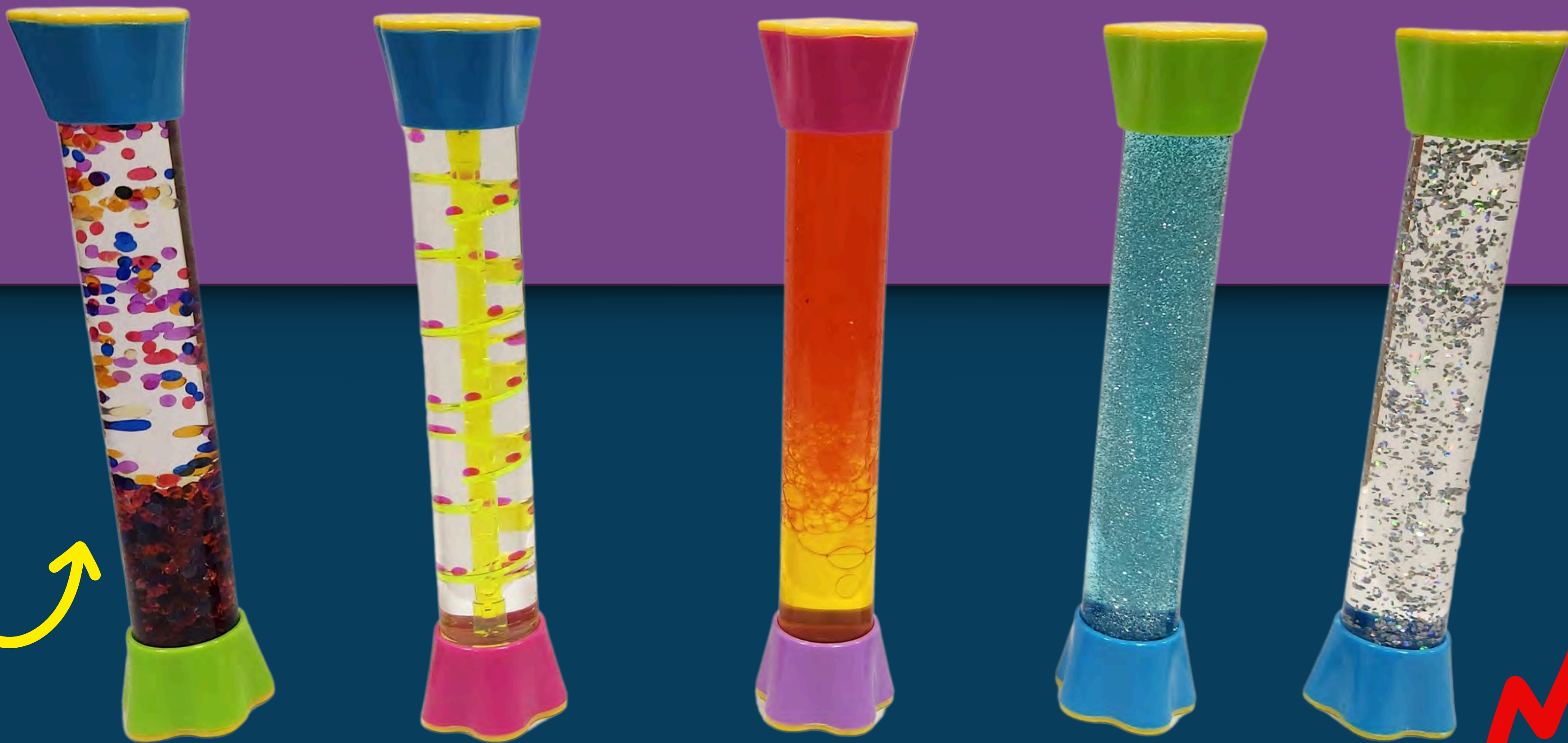
1. Fill the container with 1L of water.
2. Predict if the objects will float or sink.
3. Test each object in the water. Did it float or sink?
4. Was your prediction correct?

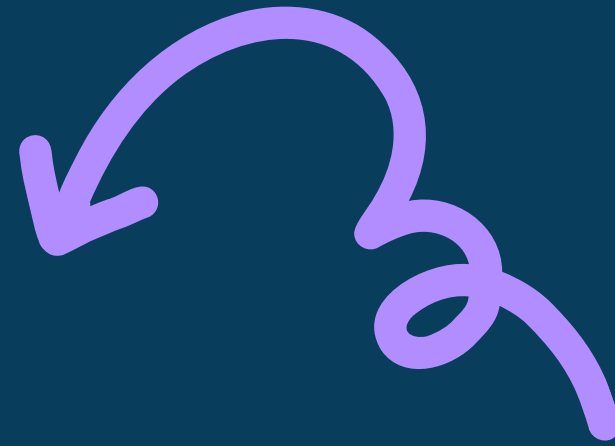


# Density Tower



# Density Tubes



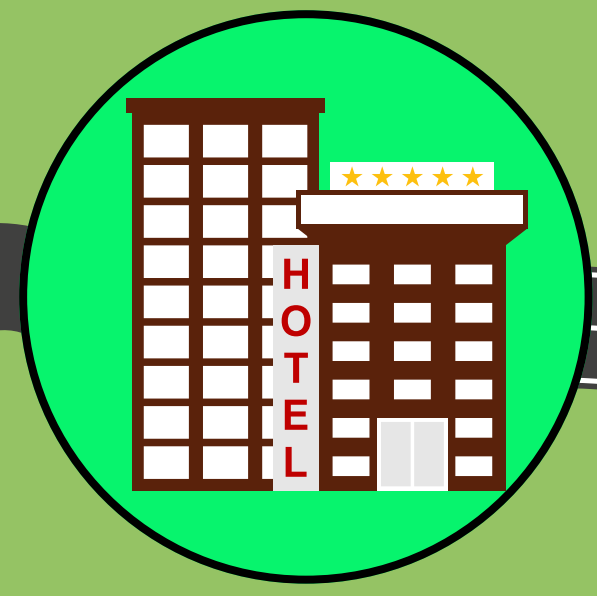
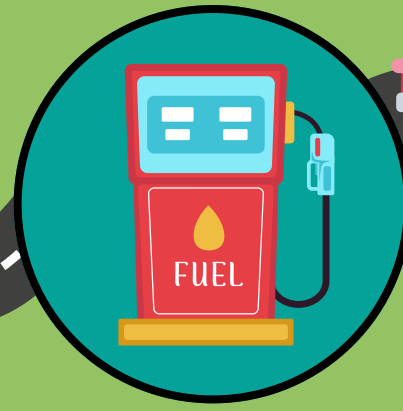
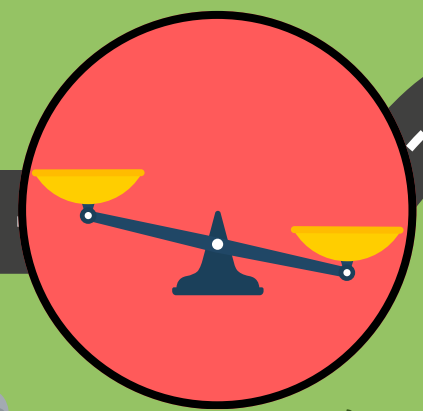
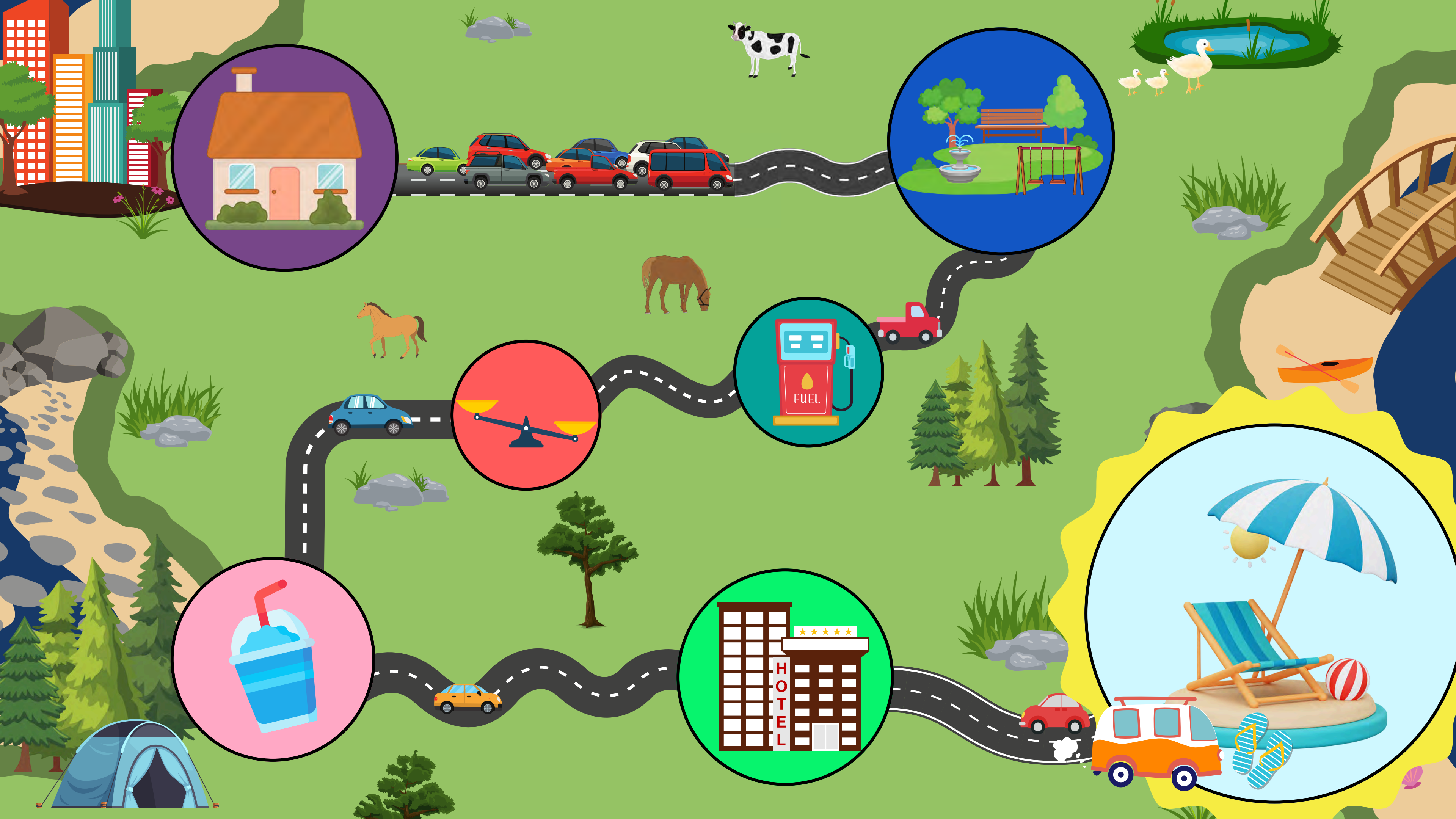


## Mystery Item Clue #3

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.





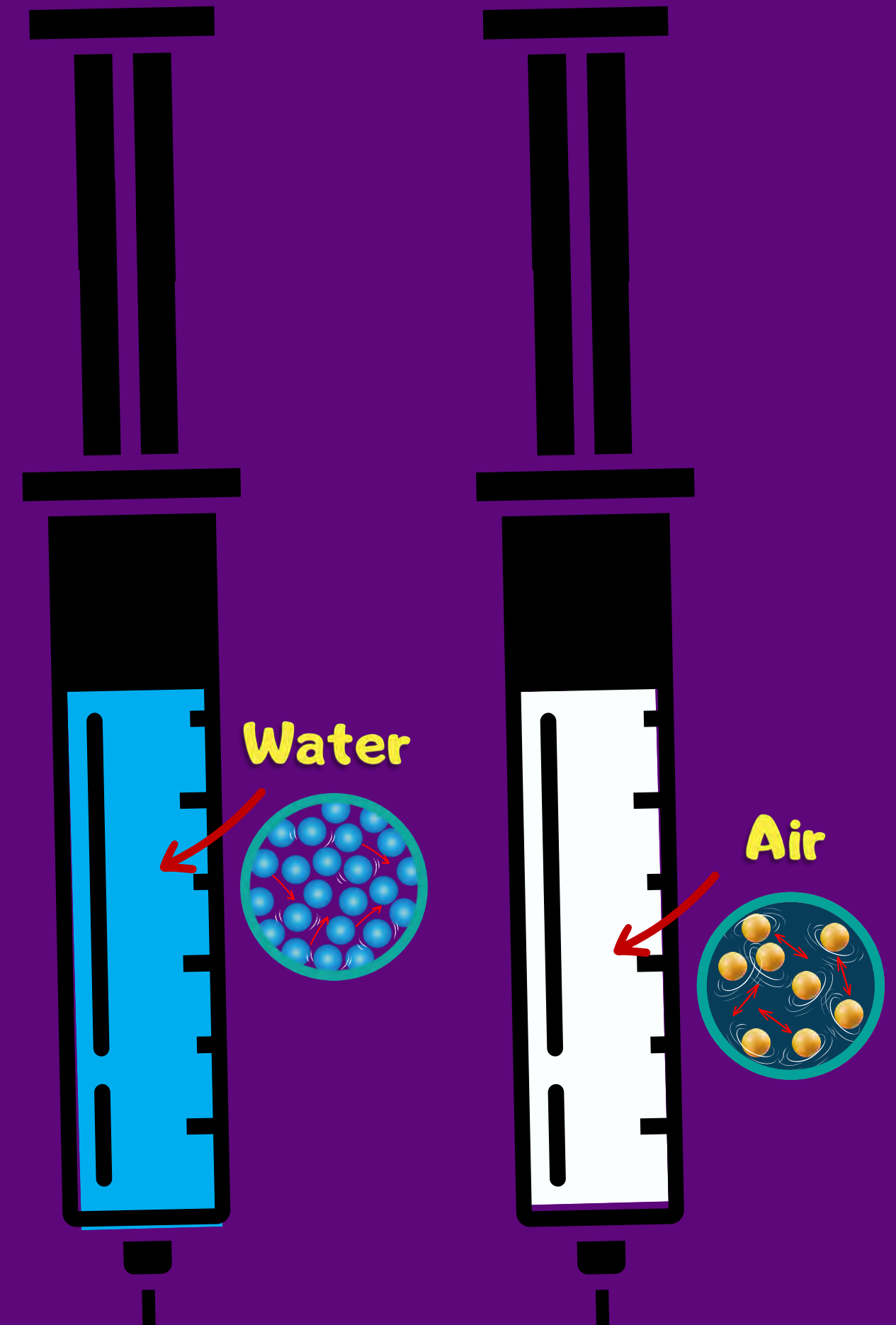
# Time to De-Compress: Compressibility

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



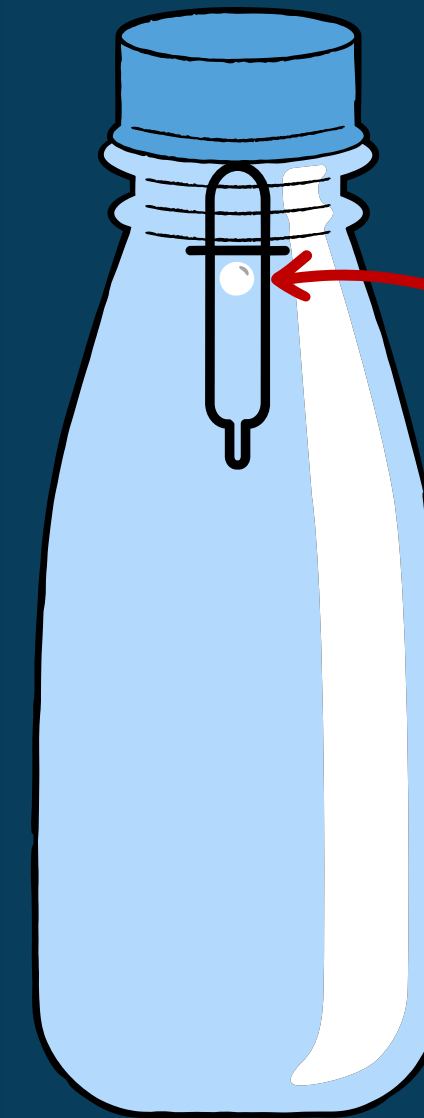
# Compressibility of Air and Water

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.

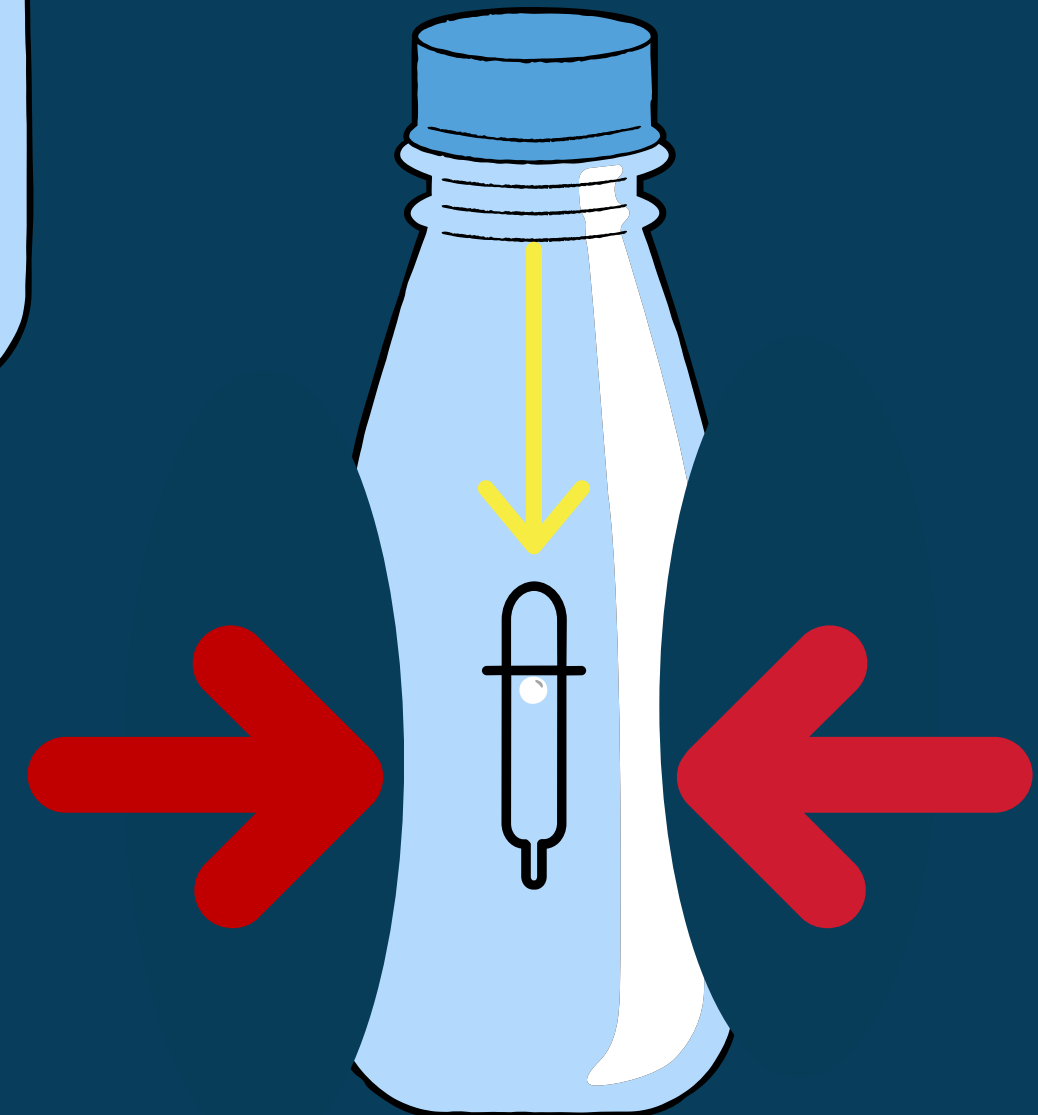


# Cartesian Diver

- 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



Air Bubble



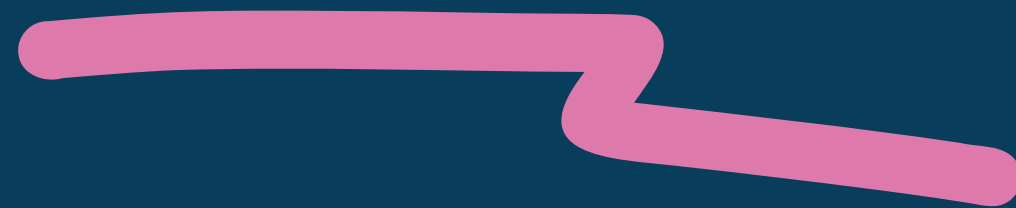
Bottle Squeezed



# 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



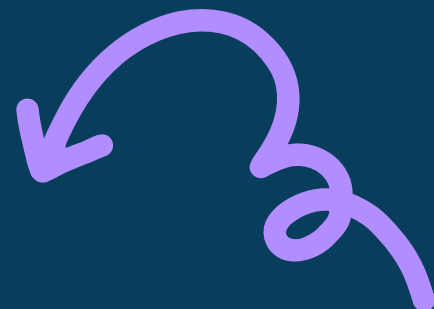
#4



#5



#6





**THANK  
YOU!**