BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI – 110034

CLASS - V **SUBJECT- SCIENCE** **TERM II (2020 - 2021)**

TOPIC- SOLIDS, LIQUIDS and GASES

SUB- TOPIC: PROPERTIES OF MATTER

NAME:_____ CLASS / SEC:_____ WEEK -18.01.2021 to 22.01.2021

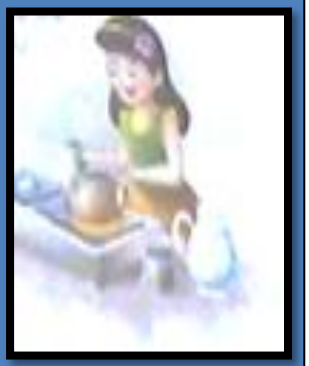
LEARNING OUTCOMES :

Each child will be able to :-

- State the common properties of all kinds of MATTER.
- Categorize different types of matter found in their surroundings into different states.
- Distinguish between the properties of different states of matter.
- State the particle arrangement in matter.
- Observe the changes in states of matter.

We see different things around us. All these exist in different forms and are made up of different material. Let us explore…

ACTIVITY:



It was a cold day. Reema's mother had just come back from work. She looked tired, so Reema decided to make her a nice Cup of tea. She went into the kitchen, poured some water into the kettle, and put it on the gas stove. After some time, the water started to boil. Steam was coming out of the kettle and mixing with the air. She added tea leaves into the kettle. A little later, she poured the tea into a cup and added milk and sugar. She took the tea to her mother. Her mother thanked her.

Underline the different objects you find in the above paragraph. Think what material they are made up of? Classify them into solids, liquids and gases:-

(You may also think of some other objects you are likely to find in the kitchen)

SOLIDS	LIQUIDS	GASES
Cup	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

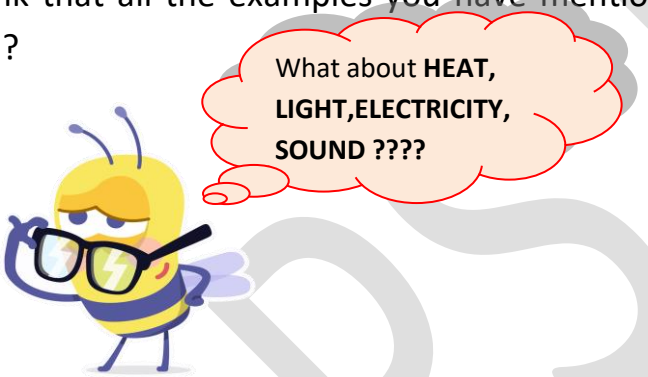
So, you see, we can find many different kinds of materials or substances around us.

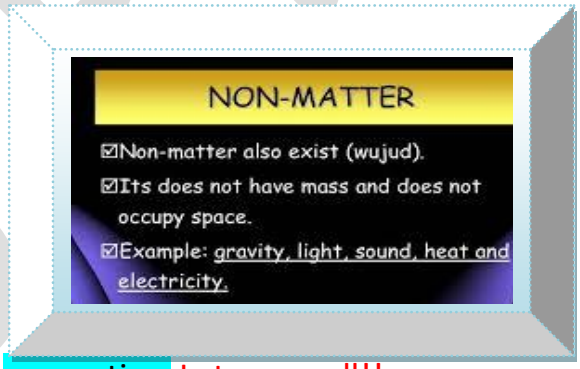
You are aware that all things, that we find in our surroundings, whether ***living*** or ***non-living*** are made up of **Matter**.

What is common between all these different kinds of matter?

All forms of matter occupy space and have weight.

Do you think that all the examples you have mentioned in the above table, fulfil these two criteria?





All the three states of matter have distinct and unique properties. Let us recall!!

SOLIDS

- A solid has a definite shape and volume.
- The shape of a solid does not change unless some force is applied on it.
- A solid is generally hard and rigid and does not flow.

LIQUIDS

- Liquid has a definite volume but does not have a definite shape.
- It takes the shape of the container in which it is kept.
- Liquids can flow from higher to lower level.

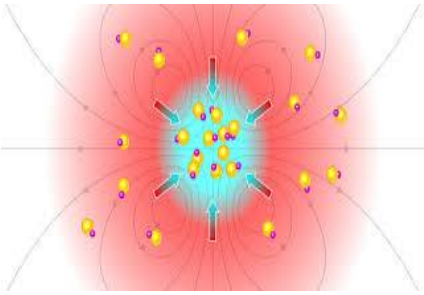
GASES

- Gas has neither a definite shape nor a definite volume.
- It occupies the entire space in the container in which it is kept.
- Gases can flow easily and spread fast in all directions.

What makes each matter distinct and unique?

You are aware that every matter is made up of small particles called MOLECULES .

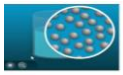
Arrangement of the molecules in a substance results in the different states of matter.
Molecules are made up of even smaller particles called ATOMS.



Therefore, atoms are actually the BUILDING BLOCKS OF MATTER.

DID YOU KNOW ??

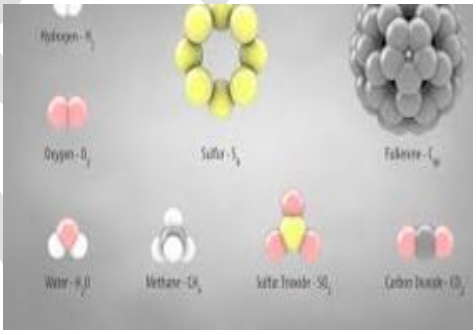
One drop of water has billions of



water molecules.

LET US REVIEW THE COMMON PROPERTIES OF ALL THESE MOLECULES…

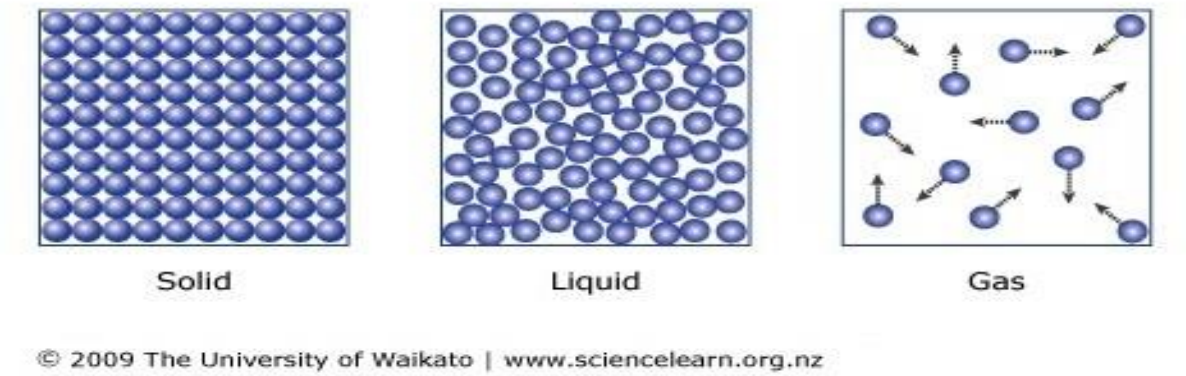
- **Molecules, which make up all matter are so tiny that they cannot be seen with the naked eye but can be seen with a very powerful microscope.**
- **The molecules of every substance are different from the molecules of any other substance.** (Thus, a molecule of common salt is very different from a molecule of sugar.)
- **The molecules of a particular substance are always alike and have the same properties as that of the substance. (same taste, colour, smell etc.)**
- **The molecules have some gap or space between them, called INTER MOLECULAR SPACE.**



- **The molecules always keep moving about, they are never still.**
- **They keep moving because they are always pulling each other, by some force called INTER MOLECULAR FORCE OF ATTRACTION.**

The manner in which these molecules are arranged within a particular matter, results in the three different states of matter.

Now let us see how this arrangement affect their characteristics…



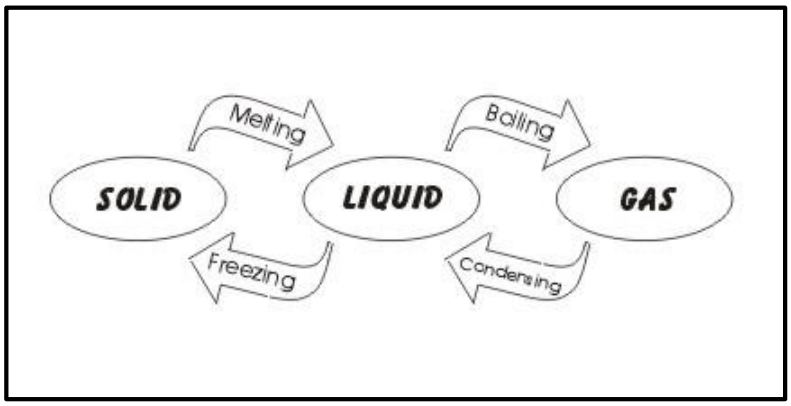
SOLID MOLECULES	LIQUID MOLECULES	GAS MOLECULES
-Have little intermolecular space and very strong force of attraction between them, which keeps them tightly packed.	-Have more intermolecular space and less force of attraction between the molecules, so they are not as tightly packed as in solids.	-Have large inter molecular space and very little or almost negligible force of attraction between them so they remain far apart.
-Molecules cannot move away from their place, but can only vibrate a little, giving solids a fixed shape and volume.	-The molecules can move easily and can slide past one another. Thus, liquids do not have a fixed shape and take the shape of the container. They have a definite volume.	-Molecules can move around freely. They can also spread fast wherever they find the space. That is the reason they do not have affixed shape or volume.
-Since the molecules do not move or slide past one another, they do not flow. They are hard and rigid.	-Since the molecules can move/slide past one another, they can flow easily.(liquids normally flow downwards)	-Since the molecules cn move away from each other very quickly, they flow very easily and spread in every direction.
Examples: ice, stones, iron	**Examples:** water, oil, milk	**Examples:** water vapour, oxygen, smoke.

CHANGE OF STATE

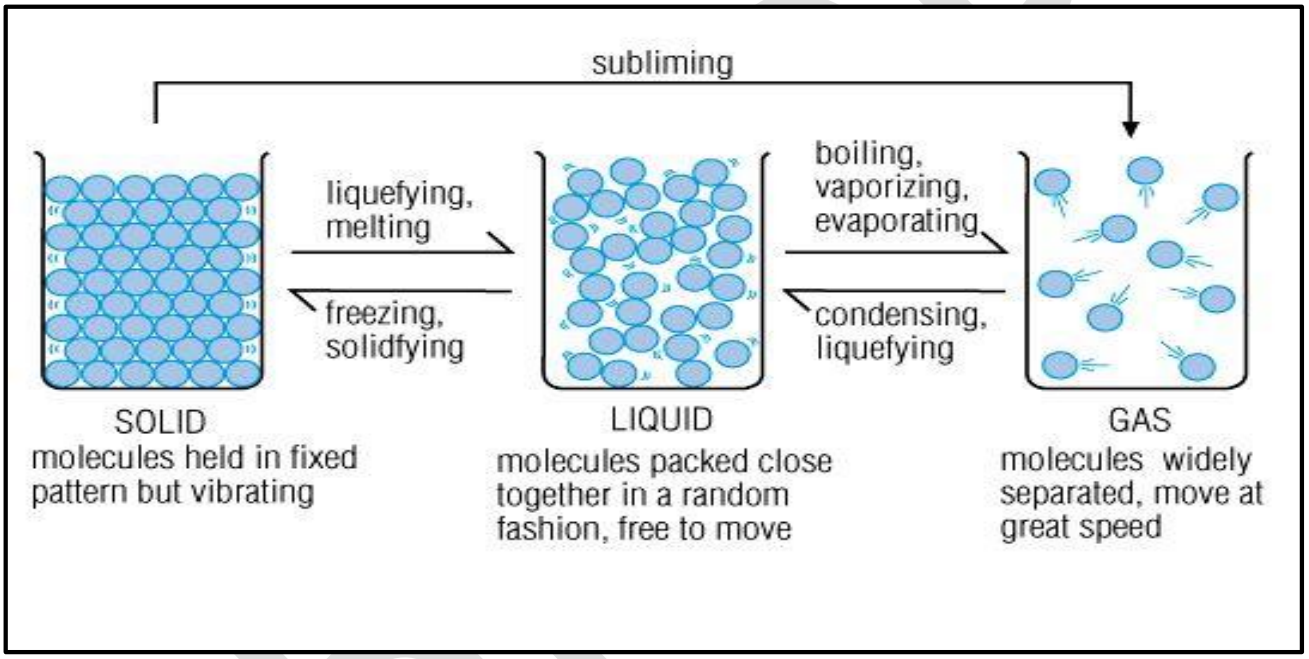
Substances can change state, usually when they are heated or cooled.

For example: Ice cubes (solid) left outside the freezer for some time melt and turn into water (liquid). If we put the melted water back into the freezer, it will solidify into ice after some time.

Similarly, when water (liquid) is boiled, it changes into steam (gas). As soon as the steam is cooled, it changes back into water.



Let us see what happens to the molecules when such changes take place due to heating or cooling.



When a solid is <u>heated,</u> the molecules <u>gain energy</u> and their <u>motion increases</u>. So, when a solid is heated to a certain temperature, the molecules vibrate to the extent that their regular structure breaks down and they start <u>expanding</u>. At this point the solid <u>melts</u> into liquid.

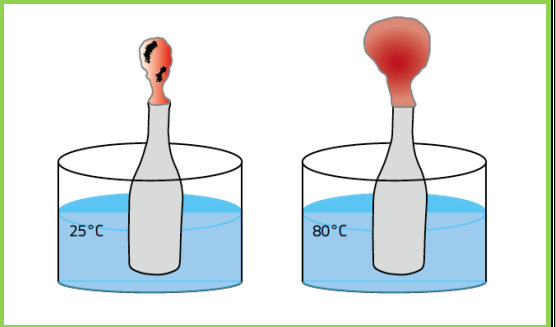
-On the other hand, when the liquid is <u>cooled</u>, the molecules <u>lose energy</u>. This loss of energy <u>decreases the motion</u> of the molecules. So, when a liquid is cooled to a certain temperature, the molecules <u>come closer</u> to each other (contract) due to an increase in their intermolecular force of attraction. As they come closer, they arrange themselves in a regular pattern. At this point, the liquid starts changing into solid state.

-The same process occurs when a liquid is heated, and it evaporates. When the vapours are cooled again, they condense to change back into a liquid as the molecules come closer.

Click here to learn more about changes in matter https://youtu.be/xYU7RSoOZ0U

Activity Time

To understand that heating causes expansion and cooling causes contraction (adult supervision required)



What you need: 2 empty bottles, 2 balloons, a bowl containing hot water and a bowl containing cold water.

What you do:

1. Stretch the open end of the balloons and fix them around the mouth of the bottles.
2. Place one bottle in the bowl of hot water, and the other in the bowl of cold water.
3. Wait for some time and observe the two balloons.

What you find: The balloon gets inflated when the bottle is placed in hot water but gets deflated when placed over cold water.

What you conclude: When the bottle is kept in hot water, the air inside it gets heated. It expands, filling up the balloon. When the bottle is kept in cold water, the air inside it cools. It contracts and moves downwards, deflating the balloon.

CREATIVE CORNER {AIL ACTIVITY}

Create your own model of molecular arrangement of solids, liquids and gases using beads, marbles, or any other material of your choice.

Watch the following video to get more ideas:-

https://youtu.be/bz5J8NWG2DY

LET'S REVISE

Q1. Choose the correct option :-

a) These have the least intermolecular space:

i) Solids ii) Liquids iii) Gases iv) Semi-solids

b) Which of these describes the molecular arrangement in Solids:

i) Very loosely packed; no regular arrangement.

ii) Lot of intermolecular space.

iii) Tightly packed with a regular pattern.

iv) Weak intermolecular force of attraction.

c) Which of these has a fixed volume but no fixed shape:

i) Steam ii) Water iii) Ice iv) Bricks

d) The process by which a liquid change into gas on heating:

i) Melting ii) Freezing iii) Evaporation iv) Condensation

e) Condensation is the process by which a gas changes into its liquid form on:

i) Heating ii) Evaporation iii) Cooling iv) Boiling.

Q2. Complete the following sentences by giving reasons:

a) **When we pour some water on any surface, it flows away because**_____

_____

_____

_____.

b) **Gases have neither a definite shape nor a definite volume because**

_____

_____

_____

_____.