Solids, Liquids and Gases

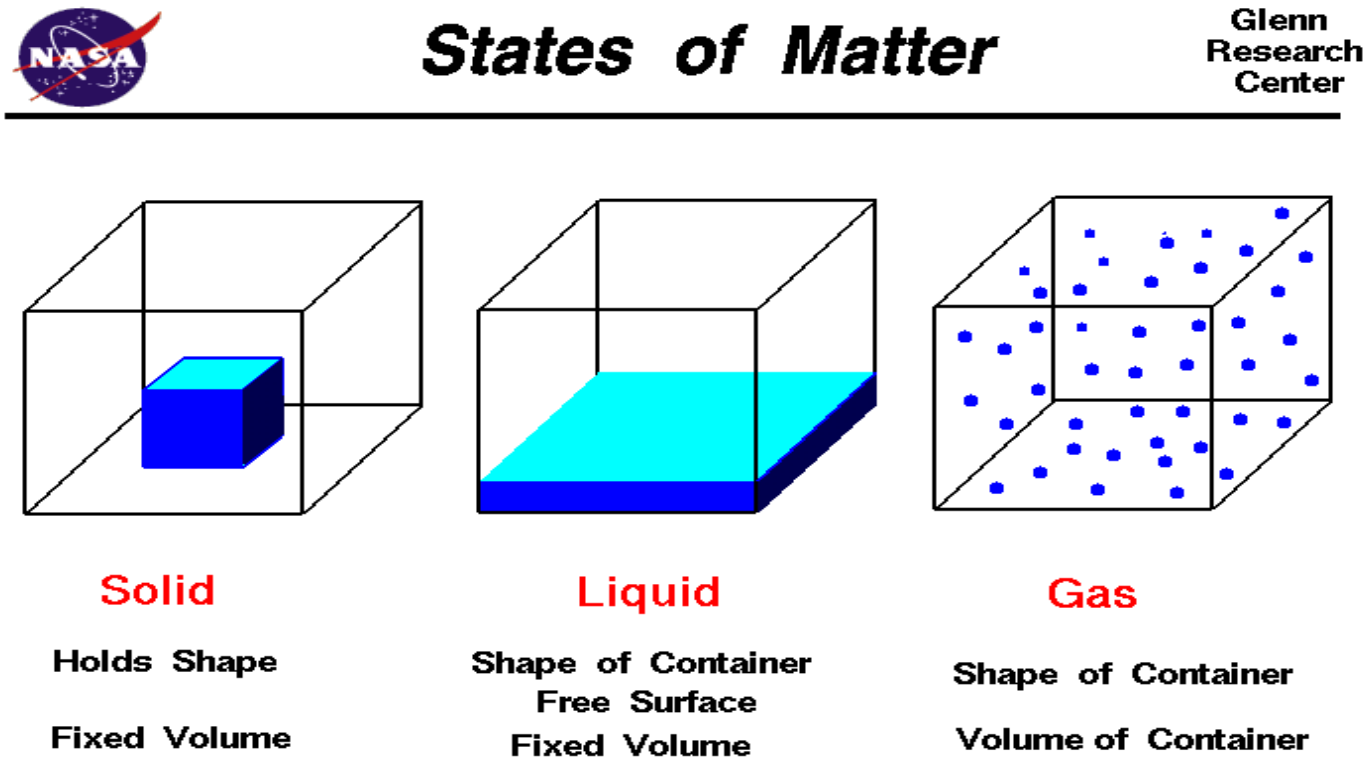
PARTICLES

Learning Objectives:

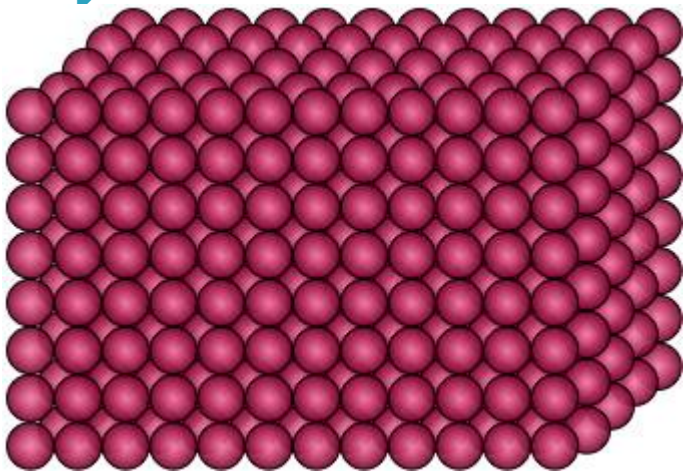
- Understand what states of matter and state is.
- Understand what the particles in solid, liquids and gases look like, how they move and also their strength of bond.
- Begin to understand the process of changing state and the definition of expansion and contraction.

States of matter

- All matter exist in one of three states: **solid, liquids and gases.** Each of these have different arrangements of **particles.**



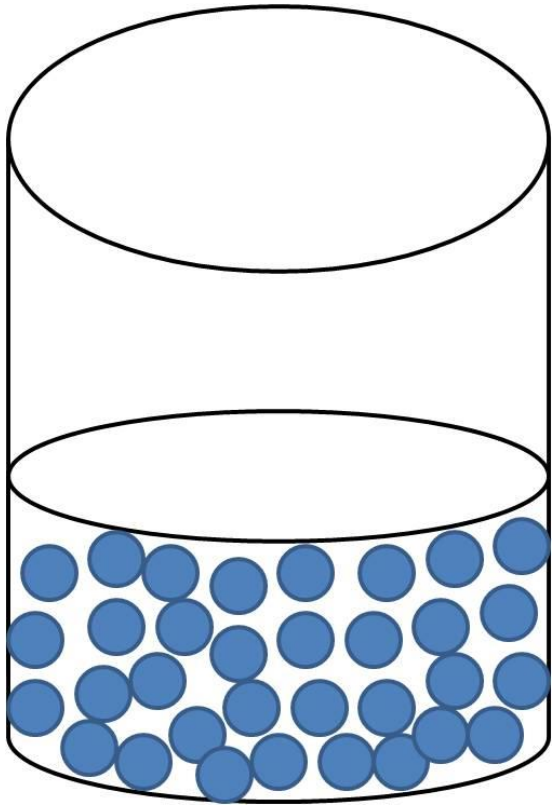
Particles in solids



This is a solid particle diagram. In a solid, particles are packed tightly together in a regular pattern. Solids have fixed shaped that are hard to break apart because individual particles do not have enough energy to escape individually. Solids are ALWAYS in a regular lattice pattern.

You can lose marks on an exam if you do not draw a solid particle model correctly.

Particles in liquids

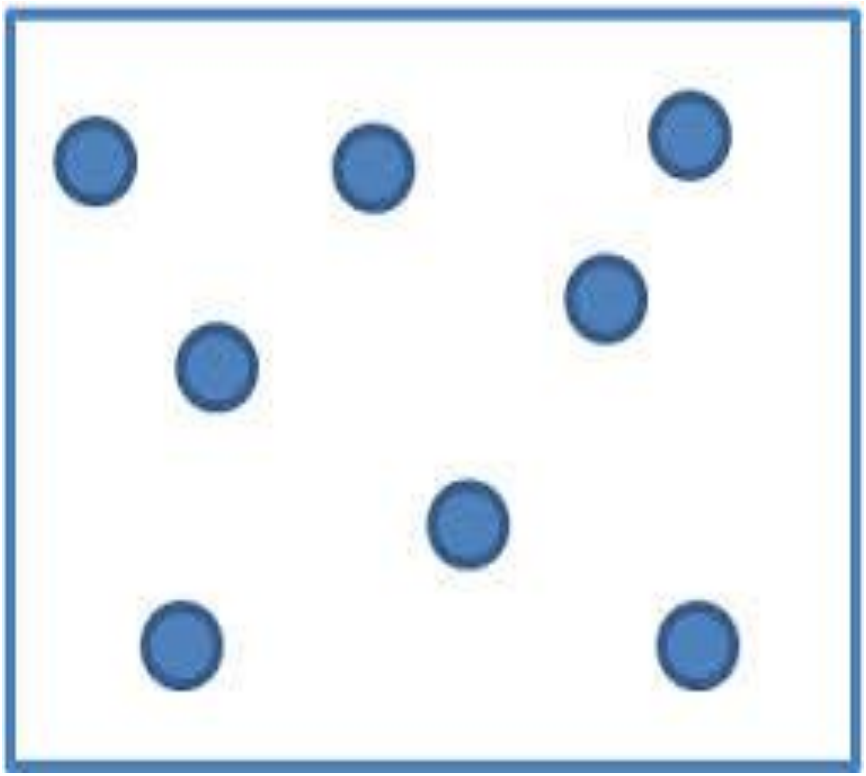


When a substance is given more energy (this can be by heat) , particles start to vibrate more and have so much energy that the structure starts to break down and move around, sliding over each other. This means it is a liquid.

Liquids can flow and take up the shape of a container because particles are able to move freely. They cannot be shaped.

When drawing a liquid particle model, you must have around two – thirds of the particles in contact with each other but not in a regular pattern.

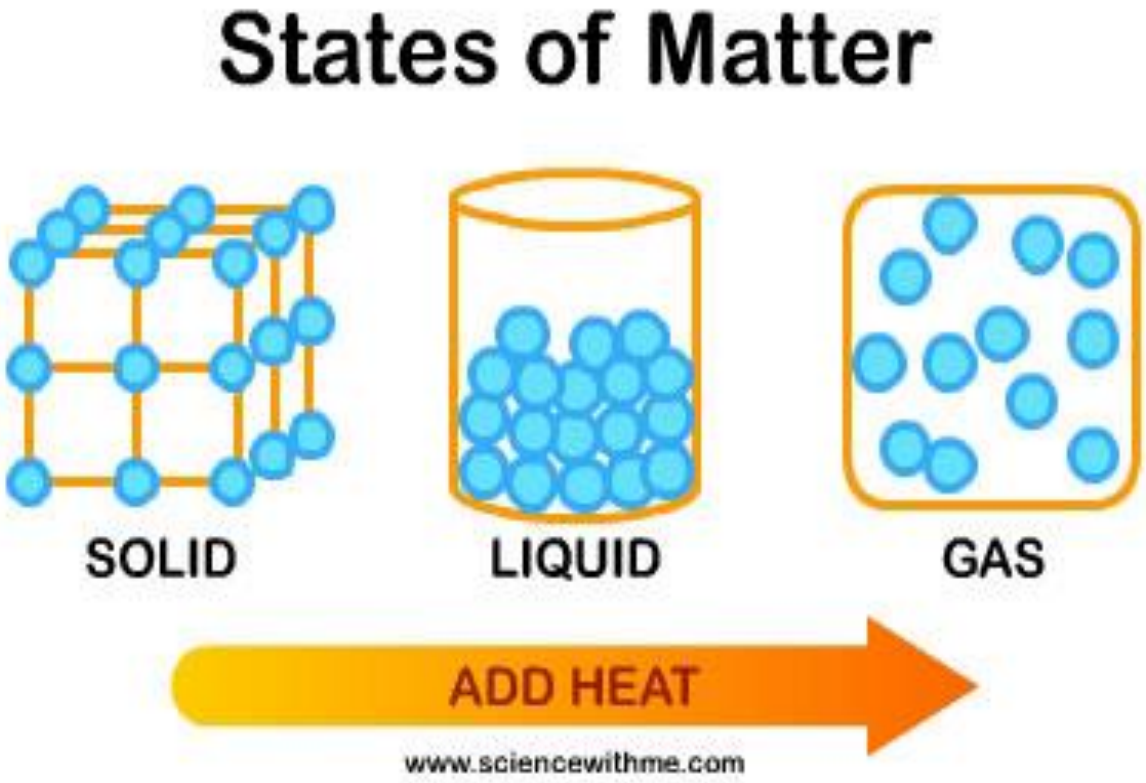
Particles in gases



If more thermal energy is put near the substance, the particles will get more and more energy until they can escape the bonds of the other particles completely . This is a gas. Gases can be squashed because there is so much space between them. They fill out whatever space is there.

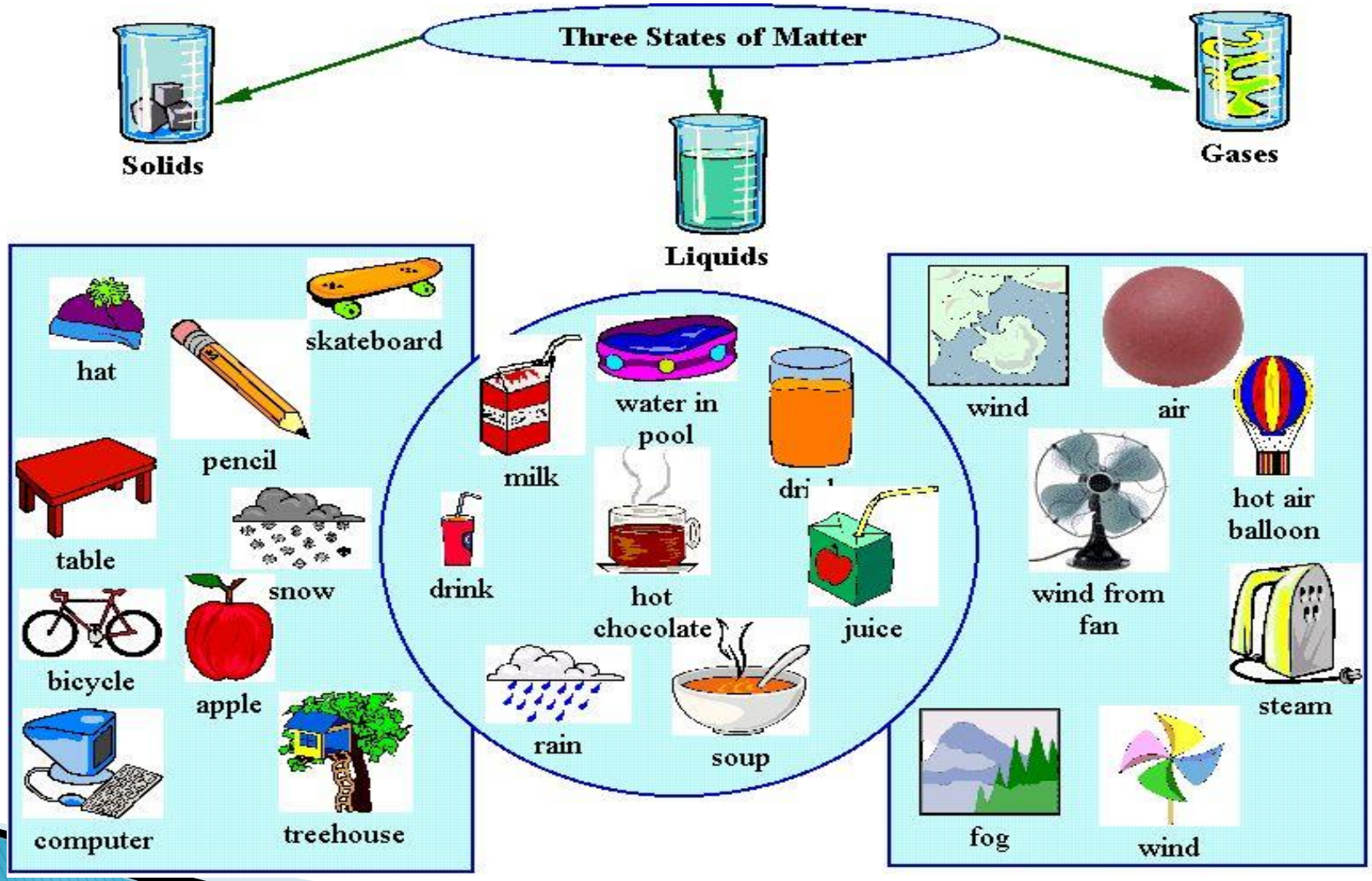
Particles are easy to draw because they are only a few and they are well space out.

States of matter



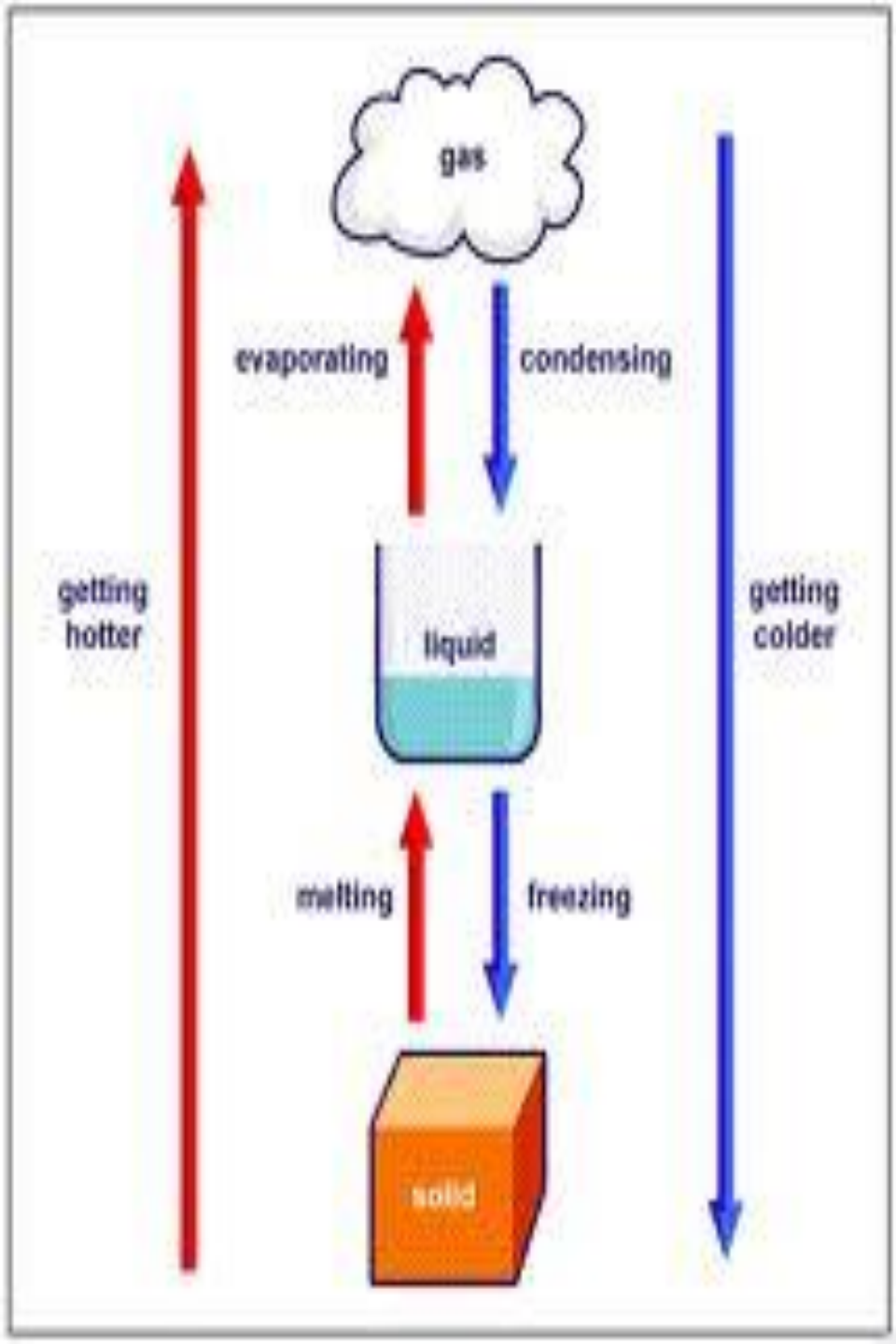
- This diagram shows that if you add heat to a substance, it can change its state of matter.

Examples of the three states of matter.



Changes of State

- A substance can change from a solid to a liquid, from a liquid to a gas, or from a liquid to a solid.
- These changes are physical changes. The substance is the same, just a different form, and the process can be reversed.



Expansion and Contraction

- Solids and liquids expand when they get hotter because the particles move further apart. When they cool, they contract because the particles become closer together.

Quick Questions

1. What is the correct name for each of these changes of state:
a. From solid to liquid
b. From gas to liquid?
2. How would you describe the arrangement of particles in a solid?
3. What are the particles in a liquid able to do that means a liquid can take on the shape of the container?
a. Draw a diagram to show how that particles in a liquid are arranged.