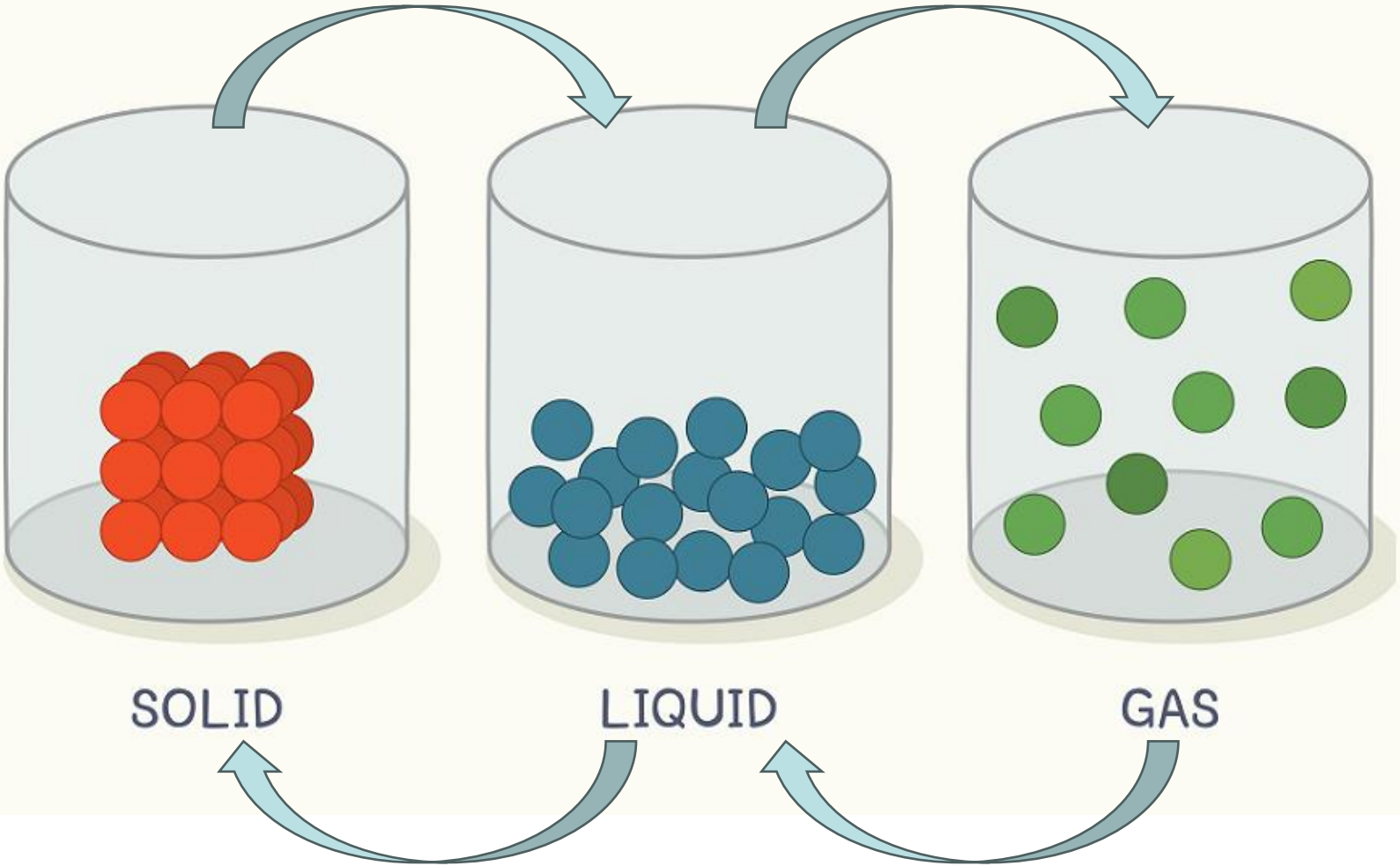
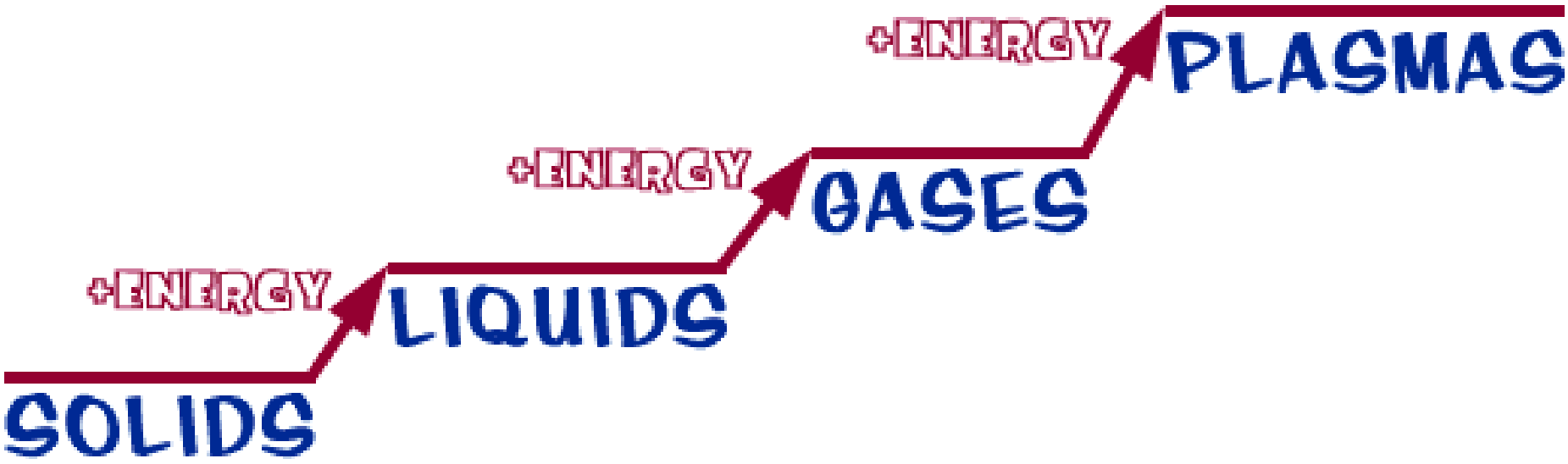
Changing States of Matter

- What determines a state?
- How does a state of matter change to a different state?
- What are the different processes by which matter changes to a new state?

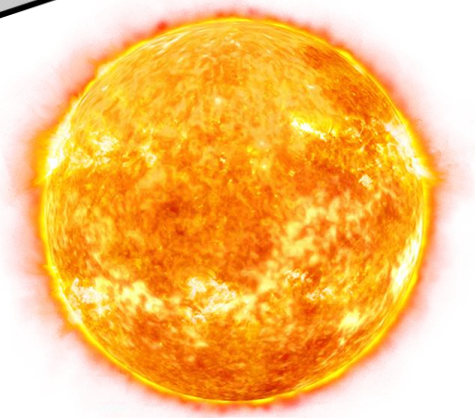
What would it take for one state of matter to change to another?



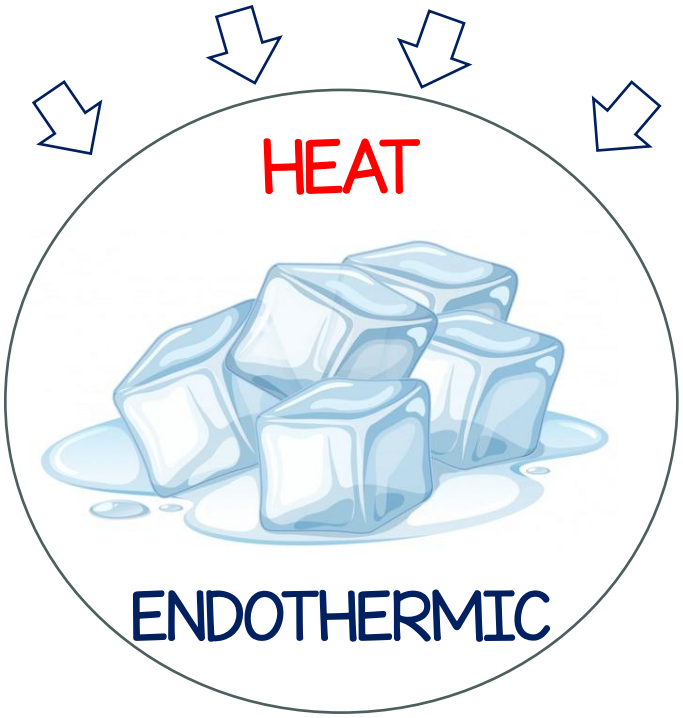
An *increase or decrease of thermal energy* will change one state of matter to another.



Thermal energy (also called *heat energy*) is produced when a *rise* in *temperature* causes *atoms and molecules to move faster and collide with each other.*



When matter changes from one state to another, it is classified as either an *endothermic* or *exothermic* change.



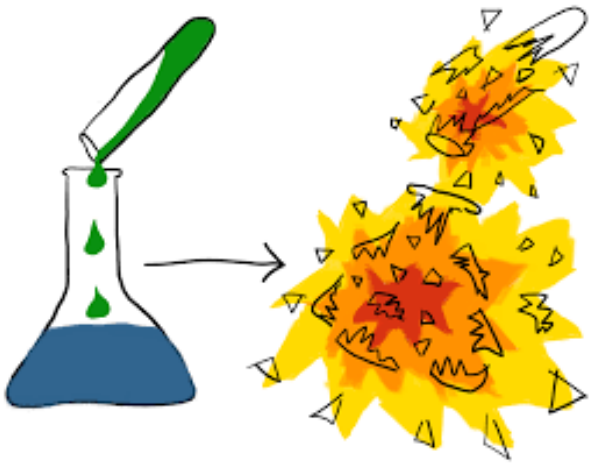
An *endothermic change* is the term used to describe a physical or chemical change in which thermal *energy increases or is absorbed*.

Evaporation

Photosynthesis

Cooking

An *exothermic change* is the term used to describe a physical or chemical change in which *energy decreases or is released*.



Chemical Change

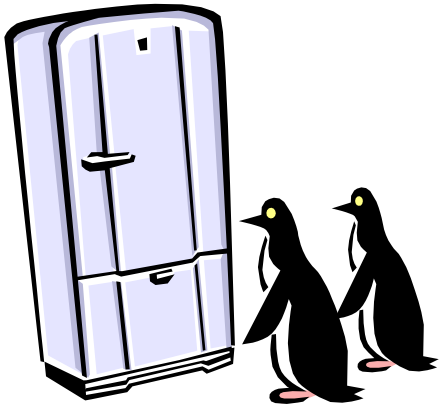
Fire

Freezing water into ice

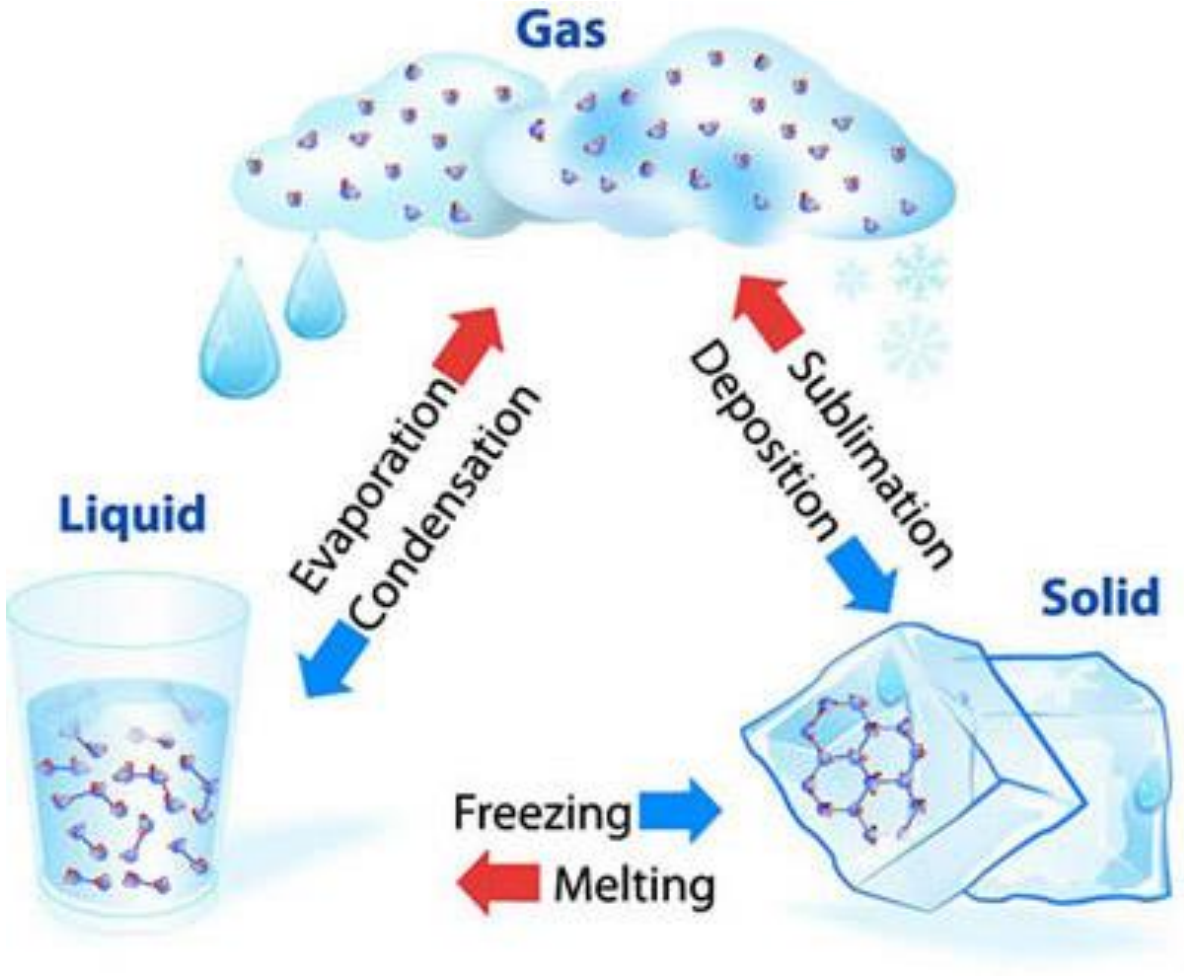
Add or Subtract Energy. . .

When energy is added, particles move faster!

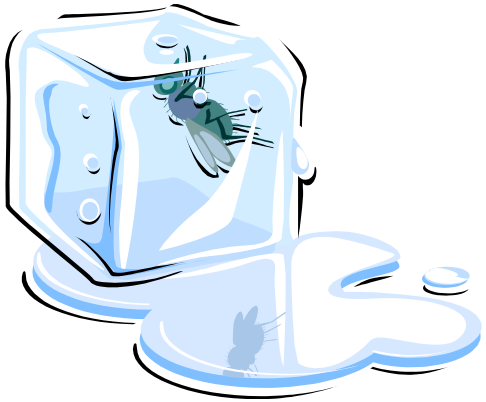
When energy is taken away, particles move slower!



A *change of state* is the conversion of a substance from one physical form to another.



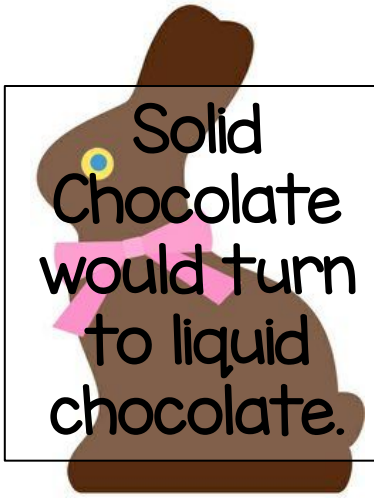
If these items were left out in the sun, what would happen to each?



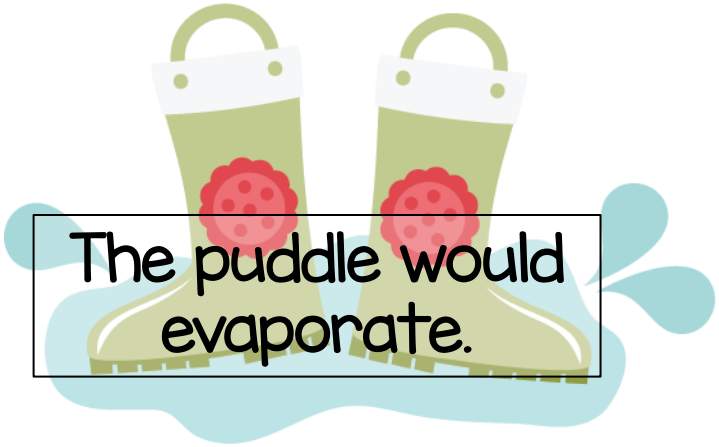
Since there would be an increase in thermal energy, these items would change their state of matter.

Solid Ice would turn to liquid water.

The ice cream would melt to mush.



Solid Chocolate would turn to liquid chocolate.

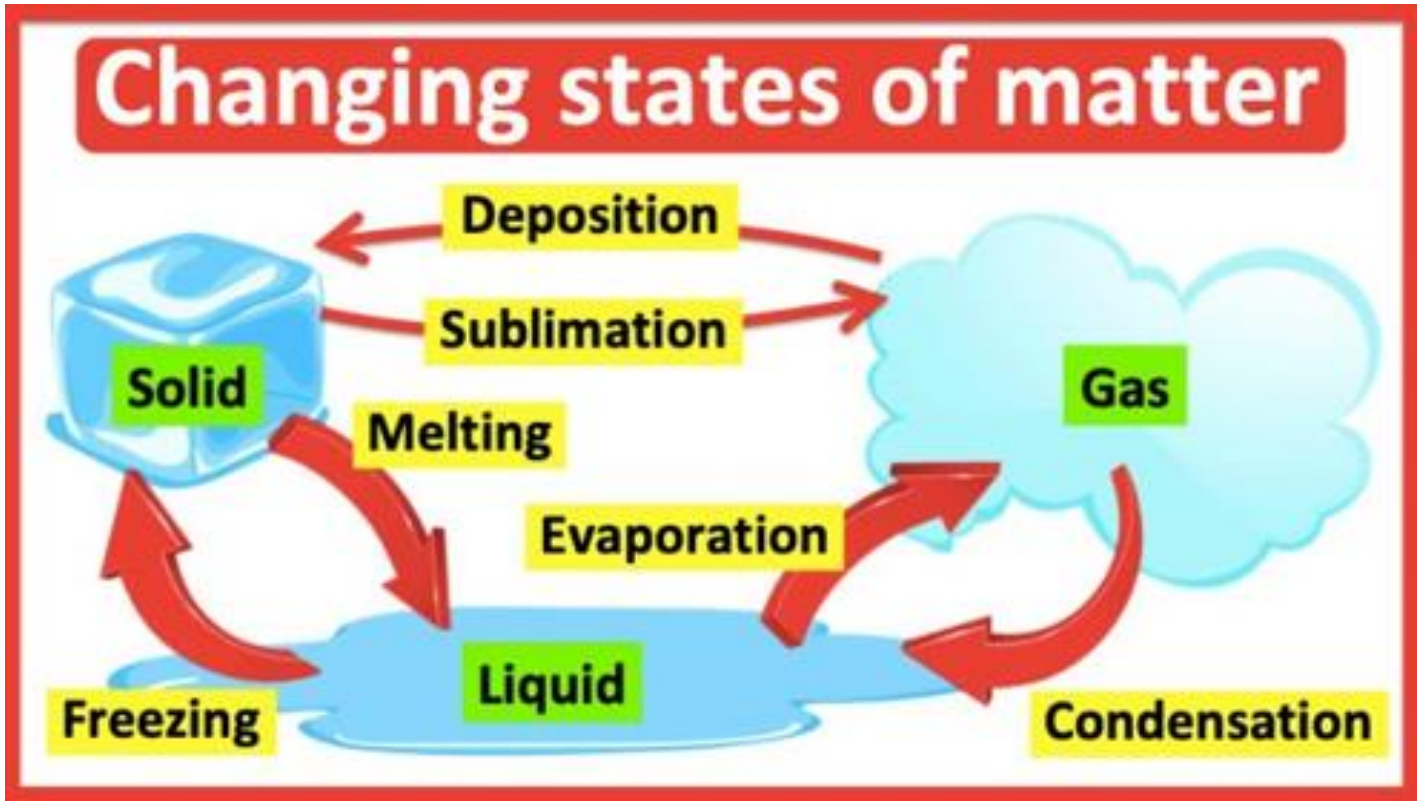


The puddle would evaporate.

The molten steel would harden to solid steel.

Matter will change its state in these different processes:

- Melting and Freezing
- Evaporation and Condensation
- Deposition and Sublimation



In the process of melting, thermal energy or heat increases.

Melting: change of state from a solid to a liquid

In the process of freezing, thermal energy decreases.

Freezing: change of state from a liquid to a solid

In the process of evaporation, thermal energy increases.

Evaporation: change of state from a liquid to a gas

In the process of condensation, thermal energy decreases.

Condensation: change of state from a gas to a liquid

In the process of sublimation, thermal energy increases.

When heated, ice melts. However, dry ice (solid carbon dioxide) sublimates.

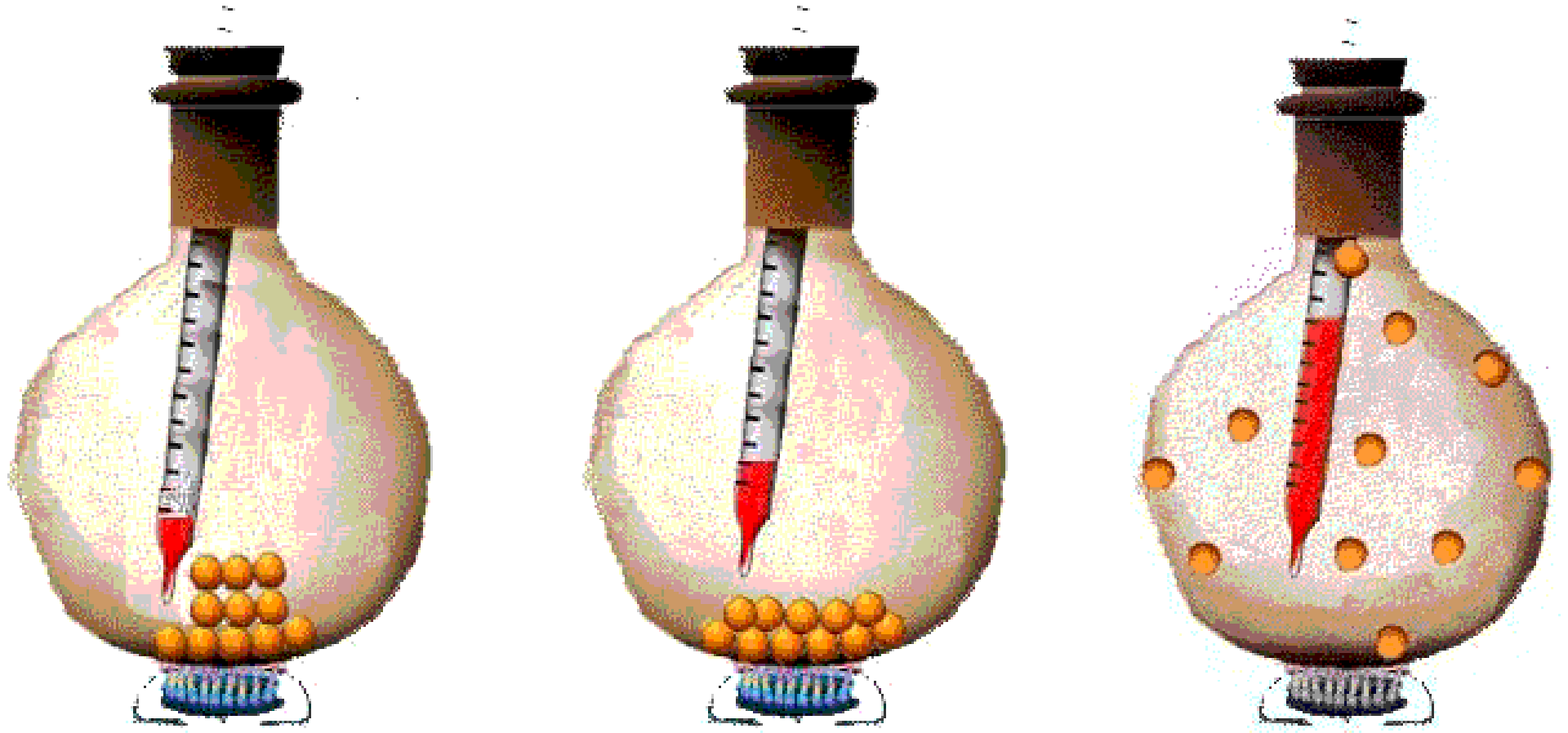
Sublimation: change of state from a solid directly to a gas

In the process of deposition, thermal energy decreases.

When water vapor turns into frost on a window, this is an example of deposition.

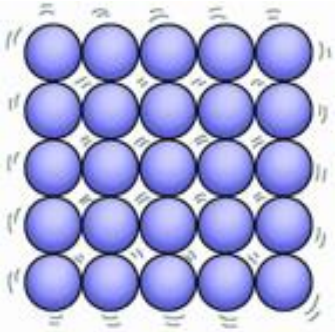
Deposition: change of state from a gas to a solid

As a state of matter absorbs thermal energy, the molecules within the matter move faster and spread out.



Student Activity

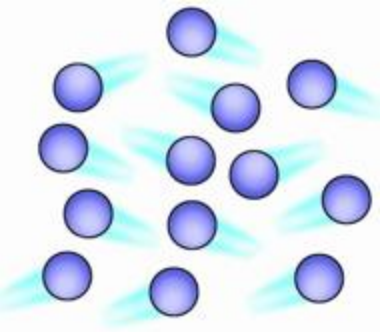
- I need 4 students to volunteer.
- Use masking tape to tape the students together.
- The students represent molecules in matter.
- Notice how the molecules are close together. They can still move, but not very much.
- What state of matter is represented?



Student Activity

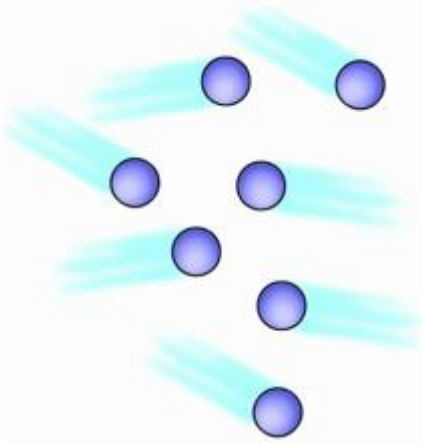
- The molecules start to gain energy. The molecules start to move around.
- The tape is broken.
- The molecules have more energy, what state of matter are the molecules in now?
- Since there was energy added for the solid to turn into a liquid, is that an endothermic change or exothermic?

It is an endothermic change. Energy had to enter the state of matter for it to change.



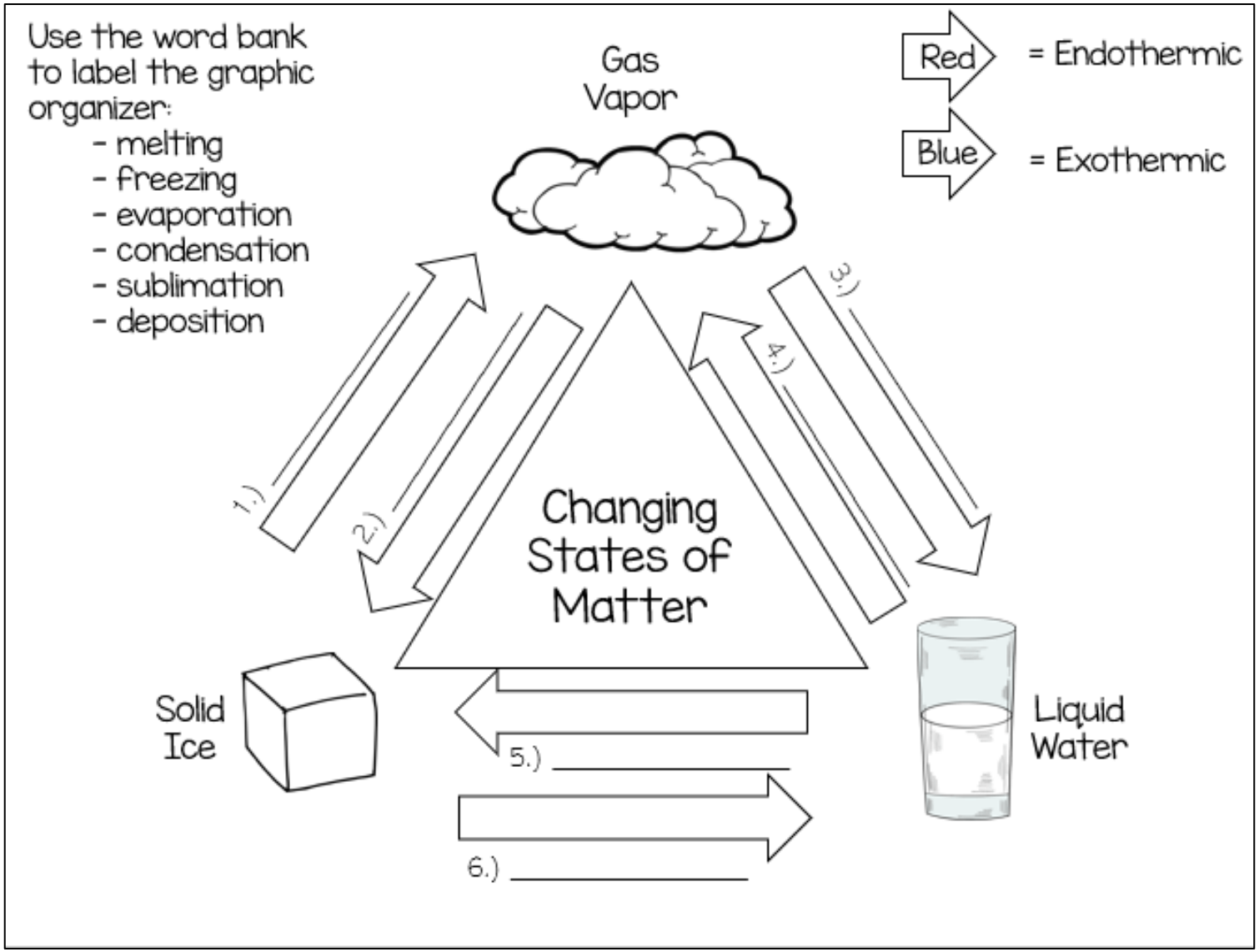
Student Activity

- The molecules gain even more energy.
- The molecules start to move even more!
- What state of matter do the molecules represent now?
- Since there was even more energy added to change the liquid to a gas, was this an endothermic change or exothermic?



It is an endothermic change. Energy had to enter the state of matter for it to change.

Complete your Changing States of Matter graphic organizer.

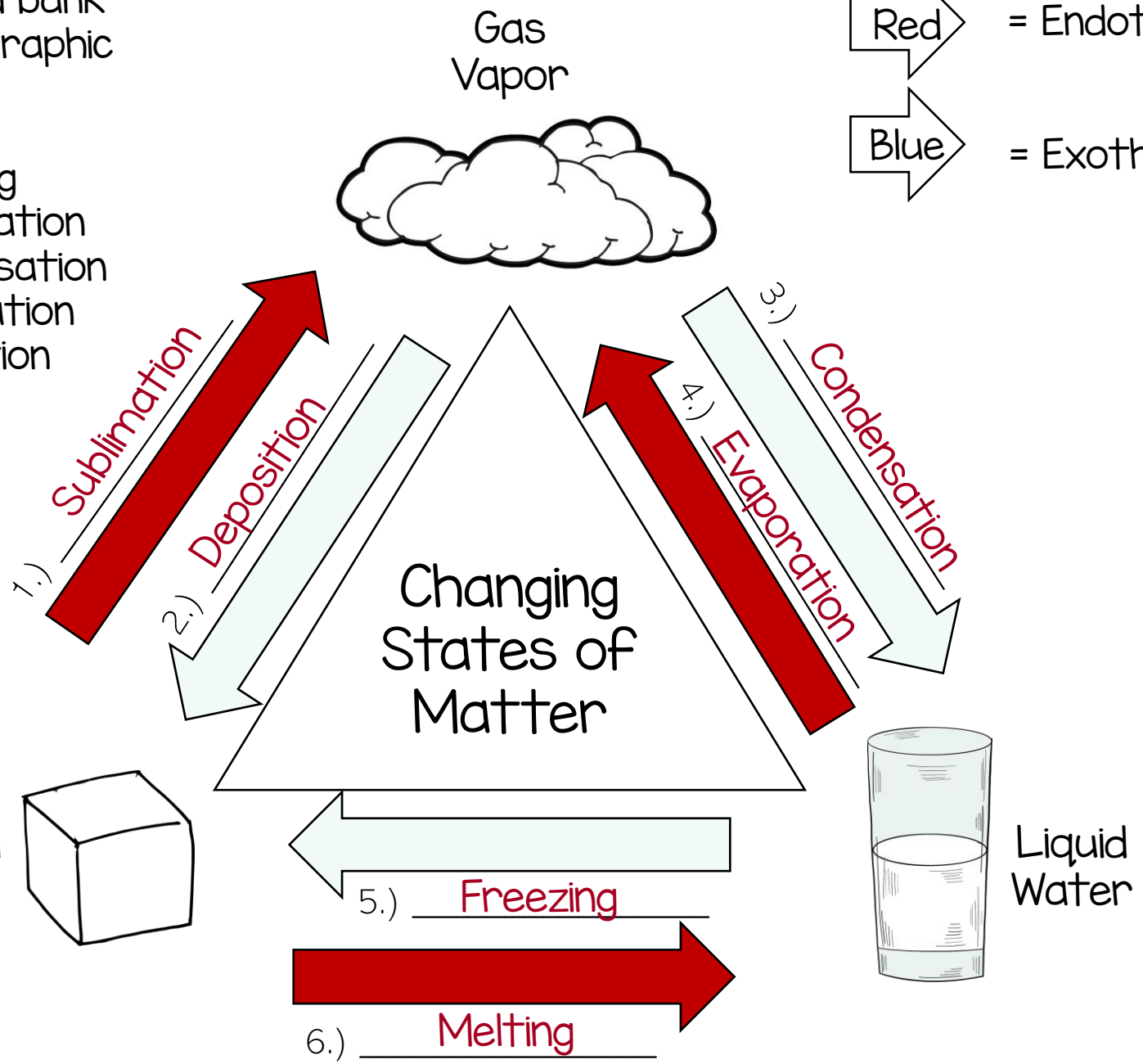


Use the word bank to label the graphic organizer:

- melting
- freezing
- evaporation
- condensation
- sublimation
- deposition

Red = Endothermic

Blue = Exothermic

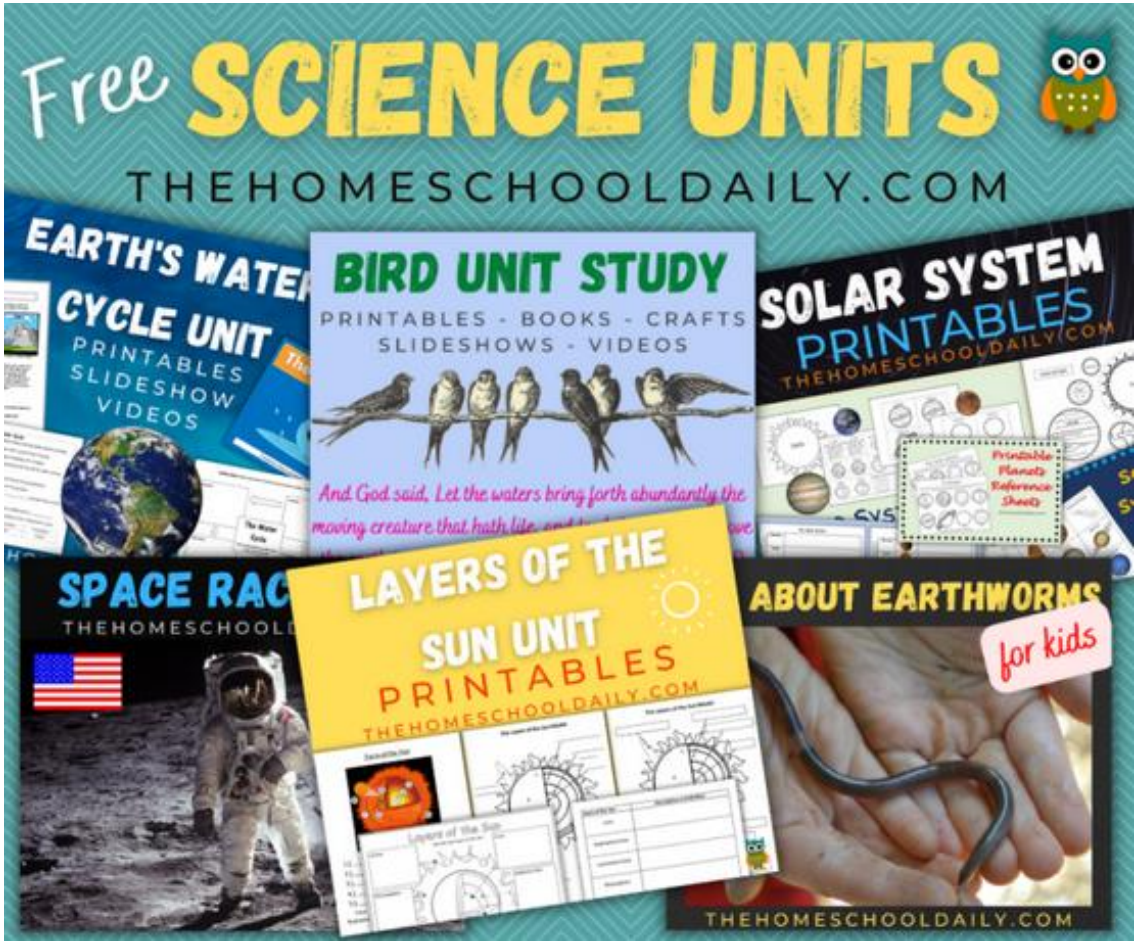


Changing States of Matter Table

Complete the table by filling in the blanks.

Change of State	Direction	Endothermic or Exothermic	Example
Melting	**Solid to Liquid**	Endothermic	**Ice melting to water**
Freezing	Liquid to Solid	**Exothermic**	Liquid water freezes into ice
Evaporation	**Liquid to Gas**	Endothermic	**Liquid water evaporating to vapor**
Condensation	Gas to Liquid	**Exothermic**	Steam condenses into liquid water
Sublimation	**Solid to gas**	Endothermic	**Dry Ice sublimes to gas**
Deposition	Gas to Solid	**Exothermic**	Vapor turns to frost on window

To learn more about matter, visit our States of Matter Printable & Activities post under our Science Units & Activities.



The HOMESCHOOL DAILY

FREE educational resources and activities

MARIE - CREATOR OF THE HOMESCHOOL DAILY

Hi! Thank you for your download. I'm so glad you were able to find a school tool you can use. Please feel free to use this activity for your own personal use or classroom. Hope it works out great!

♥ Marie