ملخص الدرس الثاني matter of States من الوحدة الثالثة منهج انسباير

الإمـــارات
THE EMIRATES

Inspire Science Program
Grade: 6 General
Subject: Science

تربيـــة وتعليم

54 عـام المجتـمع YEAR OF COMMUNITY UAE

U3: ENERGY IN THE ATMOSPHERE

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M1: ENERGY AND MATTER

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2 STATES OF MATTER

Learning Objectives U3M1L1

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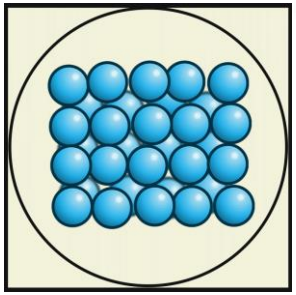
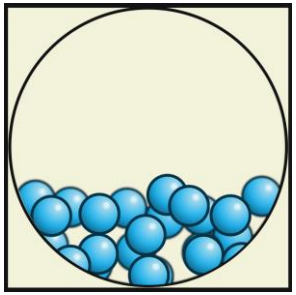
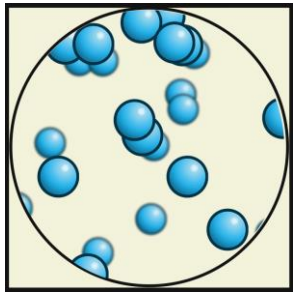
- **After completing the lesson, the students will be able to:**
  - **Identify the three states of matter and their properties.**
  - **Explain melting and freezing in terms of energy and temperature.**
  - **Explain vaporization and condensation in terms of energy and temperature.**
  - **Compare evaporation and boiling as types of vaporization.**
  - **Differentiate between kinetic and potential energy of particles.**
  - **Interpret heating curves and explain changes in energy during phase changes.**
  - **Explain why substances have different melting and boiling points.**
  - **Describe thermal energy and factors that affect it.**

States of Matter

LO: Identify the three states of matter and their properties.

- **Remember that:** States of matter are solid, liquid, and gas.

- You can determine state of matter by answering the following:
  - Does it have a definite shape?
  - Does it have a definite volume?

	Solid	Liquid	Gas
Shape	Fixed	Changing	Changing
		Take the shape of the container	
Volume	Fixed	Fixed	Changing
Particles Arrangement			

Solid-Liquid Changes

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LO: Explain melting and freezing in terms of energy and temperature.

- **Solid to Liquid (Melting):**

  - **Melting** is: the process of transforming solid into liquid.
  - Thermal energy increases and consequently the temperature.
  - Example: Ice turns to water at 0°C.

- **Liquid to Solid (Freezing):**

  - **Freezing** is: opposite of melting (transforming liquid into solid).
  - Thermal energy decreases and consequently the temperature.
  - Example: water turns to ice at 0°C.

- For the same substance Melting point = freezing points.

Melting point or freezing point is:

The point at which a substance changes between solid and liquid.

Liquid-Gas Changes

LO: Explain vaporization and condensation in terms of energy and temperature.

- **Liquid to Gas (Vaporization):**

  - **Vaporization** is: the process of transforming liquid to gas.
  - **Thermal energy increases and consequently the temperature.**
  - Example: Water boils at 100°C.

- **Gas to Liquid (Condensation):**

  - **Condensation** is: opposite of melting (transforming gas into liquid).
  - **Thermal energy decreases and consequently the temperature.**
  - Example: vapor turns to water at 100°C.

- For the same substance **Boiling point = Condensing points**.

Boiling point or Condensing point is:
The point at which a substance changes between liquid and gas.

Vaporization

LO: Compare evaporation and boiling as types of vaporization.


Evaporation


Boiling

- **Evaporation:**
  - Occurs at the surface of a liquid.
  - No need to reach boiling point.
  - Can happen at any temperature, even below boiling point.
  - Example: water in a glass slowly evaporates at room temperature.

- **Boiling:**
  - Occurs throughout the liquid.
  - Happens only when liquid reaches its boiling point.
  - Requires continuous energy input to keep boiling.
  - Bubbles form inside the liquid.

- Evaporation and Boiling are types of vaporization (liquid → gas).

- During phase change, temperature remains constant until the change is complete.

Kinetic and Potential Energies

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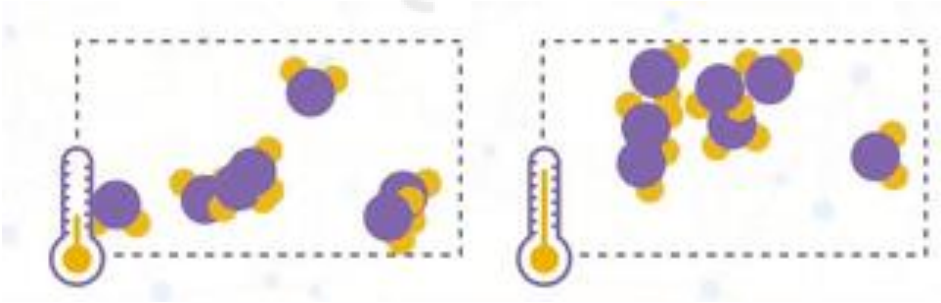
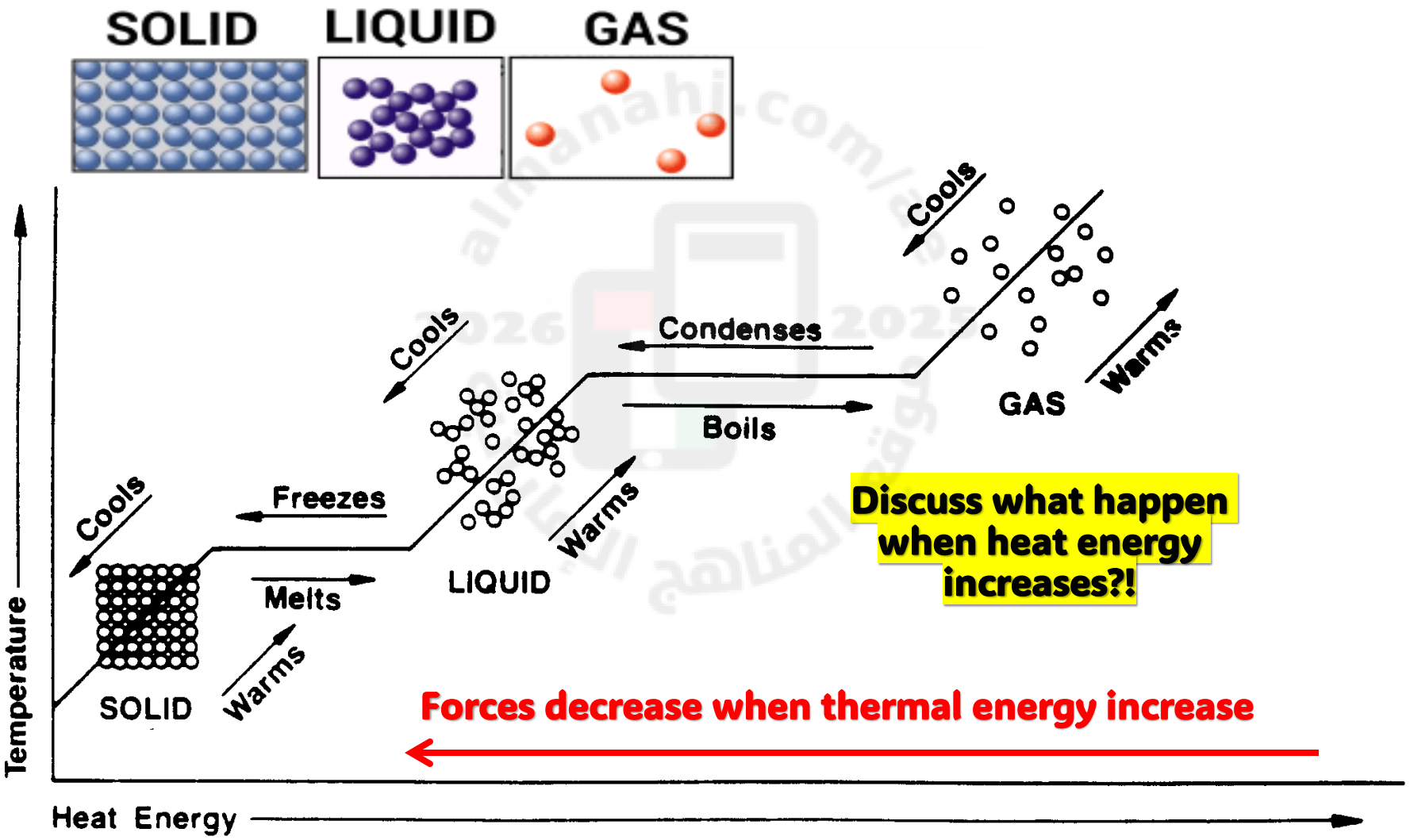
LO: Differentiate between kinetic and potential energy of particles.

	Kinetic Energy	Potential Energy
What it relates to?	Related to the speed of particles	Related to the distance and attractions between particles
How it is measured?	Measured by temperature	Measured by state of matter (solid, liquid, gas)
When it increases?	Increases when particles move faster as temperature rises	Increases when particles spread apart, as matter changes from solid → liquid → gas
When it decreases?	Decreases when particles move slower as temperature drops	Decreases when particles move closer together, as matter changes from gas → liquid → solid
Highest in	Gas	Gas



Heating Curves

LO: Interpret heating curves and explain changes in energy during phase changes.



Discuss what happen when heat energy increases?!

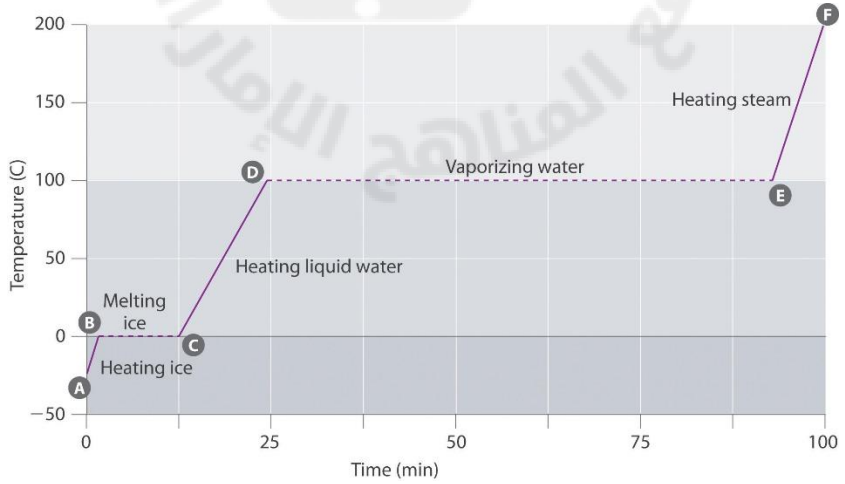
Forces decrease when thermal energy increase

Heating Curves

LO: Interpret heating curves and explain changes in energy during phase changes.

- **Heating Curves of Water**
  - When energy is added, temperature rises if the state does not change.
  - In this stage, kinetic energy increases and particles move faster.

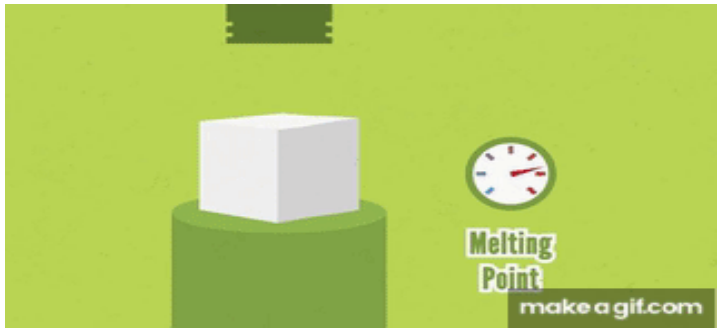
- **During Phase Changes (Melting & Boiling)**
  - At melting and boiling, temperature stays constant.
  - Energy increases the potential energy of particles.
  - Particles move farther changing state (solid → liquid → gas).



Particles and Melting Point

LO: Explain why substances have different melting and boiling points.

- Each substance has a unique melting and boiling point.
- Different substances have different particle attractions.
- Stronger attractions means that more energy needed, which give higher melting and boiling points.
- Type of particles affects how much energy is needed for state change.



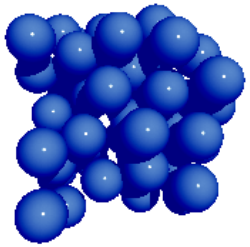
- This is why substances can be in different states at the same temperature.

Thermal Energy

LO: Describe thermal energy and factors that affect it.

Thermal Energy is:

The total energy of a system that is dependent on the number of particles in the system, the state of the system, and the temperature.



- The factors affecting thermal energy are:
  - Kinetic energy (particle speed, temperature).
  - Potential energy (particle arrangement/state of matter)
  - Number of particles (mass of substance).
  - Type of matter.

- Thermal energy is not temperature, in which:
  - Temperature = average kinetic energy.
  - Thermal energy = total of kinetic energy + potential energy.

- **Example:** Liquid metal at same temperature has more total energy than solid because it has more moving particles.

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THE END OF U3M1L2

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