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Lesson Exemplar for Science

Quarter 1
Lesson
3

Lesson Exemplar for Science 7
Quarter 1: Lesson 3 (Week 3)
S.Y. 2024-2025

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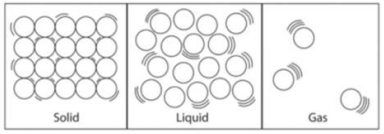
SCIENCE (CHEMISTRY) / QUARTER 1 / GRADE 7

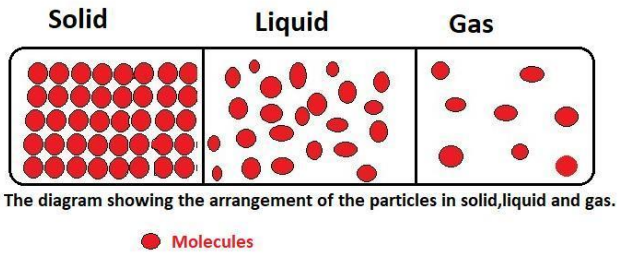
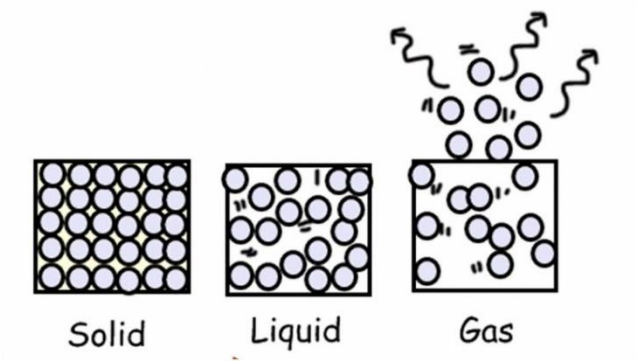
I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners shall learn that diagrams and flowcharts are very useful in demonstrating and explaining the motion and arrangement of particles during changes of state.
B. Performance Standards	By the end of the Quarter, learners recognize that scientists use models to describe the particle model of matter. They use diagrams and illustrations to explain the motion and arrangement of particles during changes of state. They demonstrate an understanding of the role of solute and solvent in solutions and the factors that affect solubility. They demonstrate skills to plan and conduct a scientific investigation making accurate measurements and using standard units.
C. Learning Competencies and Objectives	***Learning Competency:*** The learners use diagrams and illustrations to describe the arrangement, spacing, and relative motion of the particles in each of the three states (phases) of matter. ***Learning Objective:*** The learners shall be able to: 1. develop a deeper understanding of particle arrangement and movement in different states of matter (solid, liquid, gas) through various ways of expression. ***Learning Competency:*** The learners explain the changes of state in terms of particle arrangement and energy changes: a. solid → liquid → vapor, and b. vapor → liquid → solid. ***Learning Objectives:*** The learners shall be able to: 1. explain how a substance changes its state from solid to liquid to gas by analyzing particle behavior and the influence of temperature; and 2. demonstrate understanding of changes of state: solid → liquid → vapor, and vice versa.
C. Content	States of Matter and Particle Arrangement and Phase Changes

D. Integration	• Interconnectedness of Systems • Sustainability and Environmental Impact • Health and wellbeing • Scientific literacy and Scientific Qualities

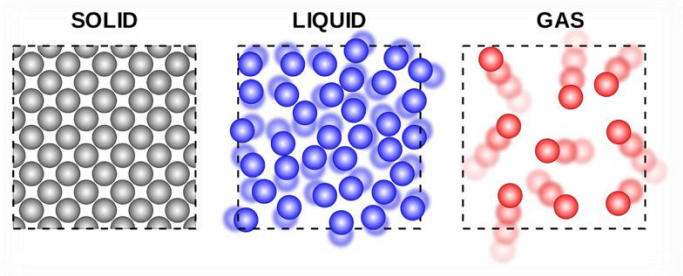
II. LEARNING RESOURCES
• Quarter 1 Worksheets for Science - Week 3

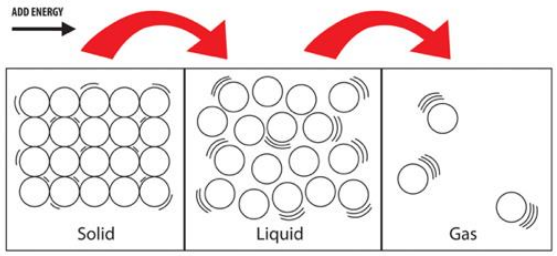
III. TEACHING AND LEARNING PROCEDURE		**NOTES TO TEACHERS**
• **Activating Prior Knowledge**	**Week 3 - Day 1** **Lesson 1: States of Matter and Particle Arrangement through Diagrams** **1. Short Review** • Kinetic Molecular Theory In solids, particles vibrate in fixed positions, while in liquids, they move more freely but are still close together. And in gases, particles move rapidly and are much farther apart.  	Start by revisiting the concept of kinetic molecular theory. Draw attention to how this theory explains the behavior of particles in different states of matter.
• **Establishing Lesson Purpose**	**1. Lesson Purpose** • Introduce how KMT is seen in particle models. • Tie these concepts back to the topic of states of matter and particle arrangement. Connect the dots for students: “Kinetic molecular theory helps us understand how particles behave in different states. This sets the stage for us to explore how particles are arranged in solids, liquids, and gases."	Emphasize that it helps us understand how particles behave in solids, liquids, and gases. Write each vocabulary term and its definition on a separate

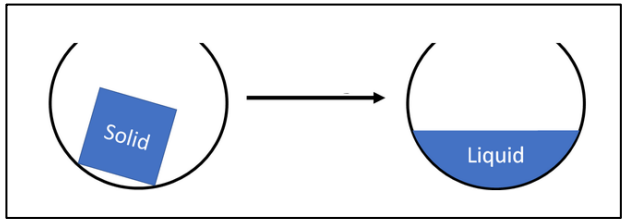
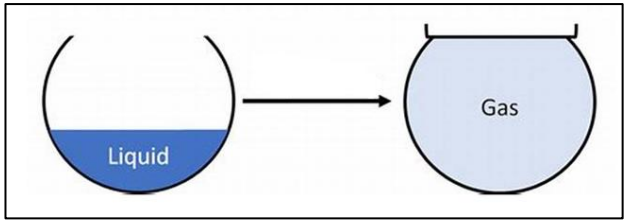
	2. Unlocking Content Vocabulary Materials Needed: • Index cards or small pieces of paper • Markers or pens General Instructions for students: 1. Each group will take turns selecting a vocabulary term from the table. 2. Without revealing the term, one from your group will read the definition aloud to your teammates. 3. The group must then discuss and decide which term from the table matches the given definition. 4. Once a match is chosen, your group will turn over the selected card to reveal the vocabulary term. 5. If the match is correct, your group earns a point. If incorrect, return the card to its original position. No point is awarded. **Points for Discussion:** • Share any terms you found challenging and discuss your understanding of each term.	index card or piece of paper. Ensure that the terms are shuffled and placed face down on a table. Divide the class into small groups of 3-4 students each. Explain to the students that they will be participating in a vocabulary matching game related to states of matter and particle arrangement. Repeat steps 1-5 with the next group until all vocabulary terms have been matched. Terms to be unlocked: Particle Solid Liquid Gas Plasma Melting Freezing Condensation Evaporation Sublimation Deposition Ionization Clarify any misconceptions and reinforce the definitions of the vocabulary terms as needed**.**

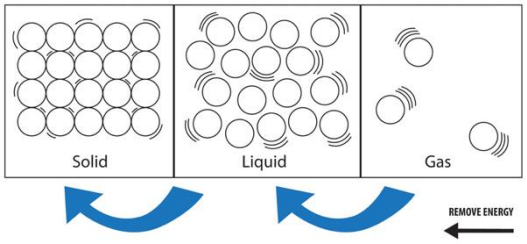
• **Developing and Deepening Understanding**	**1. Explicitation** Prompt Questions: • How do you imagine the arrangement of particles in a solid, liquid, or gas? • What tools or visuals help you understand the concept better?  Source: https://brainly.in/question/4037846  Source: https://i.pinimg.com/736x/bc/62/cf/bc62cfde91a0ccf4027049b8b9ef66ff.jpg **2. Worked Example: Drawing Diagrams** 1. Each group should choose a specific substance (e.g., water, iron, oxygen) and create a series of diagrams illustrating the particle arrangement at low and high temperatures. Use a blank sheet of paper and marker.	Begin by asking students to reflect on how they visualize the arrangement of particles in different states of matter. Display diagrams and illustrations depicting the arrangement and motion of particles in solids, liquids, and gases. Sample Illustration is given. Guide students in observing and analyzing the visuals, focusing on the spacing, arrangement, and motion of particles in each state. Encourage students to describe what they observe using vocabulary terms related to particle arrangement. Divide students into small groups. Provide each group with a blank sheet of paper and markers. Instruct each group to choose a specific substance (e.g., water, iron, oxygen) and

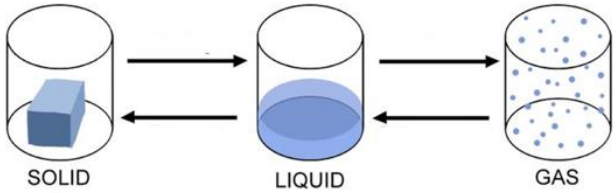
	2. To depict motion, you can use arrows and other helpful legends. Label your diagrams with the appropriate states of matter and describe the changes in particle arrangement with temperature. 3. After drawing and discussing with your groupmates, present your diagrams to the class, explaining the changes in particle arrangement with temperature of your chosen substance. **3. Lesson Activity** • Refer to LAS 1 of Quarter 1 Worksheets for Science - Week 3 **Week 3 - Day 2** **Lesson 2: Changes of State: Solid to Liquid to Gas** **1. Short Review** *Prompt questions:* • What are the states of matter? • How do particles behave in solids? Liquids? Gases? • Can you describe the arrangement of particles in each state?	create a series of diagrams illustrating the particle arrangement at low and high temperatures. They could depict particles however they want. Facilitate a class discussion on the similarities and differences between the diagrams, focusing on how particle arrangement varies with temperature in solids, liquids, and gases. Depending on time, this could be done in the classroom or could be a take home activity. Discuss plasma and ionization. Reiterate that plasma is also a state of matter and how it is made. Begin by asking students to recall the main points from the previous lesson on particle arrangement in states of matter. Encourage students to share their responses and engage in a brief discussion. Clearly state the learning objective, say "The lesson today will help you explain how a

	2. Explicitation **Visualizing Particle Arrangement**  Source: https://1.bp.blogspot.com/-vjVG1eEi3IU/VV4QGZWInTI/AAAAAAAAANE/9N_s1pRYFqM/s1600/Phases_of_matter.svg.png **Key concepts:** ○ *Solid*: Particles are tightly packed together in a rigid structure, with minimal movement. Imagine marbles jammed close together in a box. ○ *Liquid*: Particles are still close but have some freedom of movement, allowing them to slide past each other. Think of marbles in a bowl, able to move and change positions. ○ *Gas*: Particles are spread out far apart with the most freedom of movement. Imagine marbles scattered across a large room. **Temperature and Particle Energy** **Key concepts:** • *Heating a Solid*: As we add heat (energy) to a solid (like ice), the particles gain kinetic energy and start vibrating more vigorously. This disrupts the rigid structure, causing them to move around more.	substance changes its state from solid to liquid to gas by analyzing particle behavior and the influence of temperature." Briefly connect phase change to familiar experiences. Discuss everyday observations like ice melting, water boiling, or fog forming. Ask students to describe what they see happening in these situations. Explain that temperature is a measure of the average kinetic energy (movement) of the particles within a substance. Higher temperature signifies faster-moving particles. Emphasize the connection between temperature and particle behavior. Ask students if they know about the term that refers to the phase change from solid to liquid. (Melting) Ask students if they know about the term that refers to the phase change from liquid to gas. (Evaporation)

	• *Transitioning to Liquid:* With increased movement, the particles in the solid can no longer maintain their fixed positions. They overcome the forces holding them together, leading to a looser arrangement and the formation of a liquid. • *Liquid to Gas:* Further heating the liquid (like boiling water) provides even more energy to the particles. They move so fast that they overcome the remaining attractive forces and spread out far apart, transforming the liquid into a gas.  Source: https://th.bing.com/th/id/OIP.JylIwKRkyvPi4hx1J8tymQHaD2?rs=1&pid=ImgDetMain **3. Worked Example** • Refer to Part A of LAS 2 of Quarter 1 Week 3 Worksheets for Science. General Instructions for students: 1. You will be divided into groups. Make sure that all the needed materials are with your group. 2. Jot down important data from your experiment. 3. Perform Part A of LAS 2 from the Worksheet for Science 7 Week 3. Compare your results with the other groups.	Make sure to differentiate evaporation and boiling. In a nutshell, evaporation occurs only on the surface of the liquid, whereas boiling occurs all throughout the liquid. Evaporation is slower, leads to cooling (that's why it is called a "cooling process") and usually happens below the boiling point of the liquid. Use the illustration to emphasize the concepts. For review ask students to point out in the diagram specific parts that refer to melting and evaporation. Review the concepts of melting and evaporation to the students by asking them questions. Then emphasize that melting is the process of a solid turning into a liquid when heated, while evaporation is the process of a liquid turning into a gas at its surface. Emphasize that both processes involve the absorption of thermal energy.

	Points for Discussion: 1. What happens to the particles during melting and evaporation of wax? 2. How does the energy source differ for melting wax and evaporating water? 3. Can you think of examples of melting and evaporation in everyday life? **4. Lesson Activity** • Refer to Part B of LAS 2 of Quarter 1 Week 3 Worksheets for Science. **Week 3 - Day 3** **Lesson 3: Changes of State: Gas to Liquid to Solid** **1. Short Review** Picture A  Picture B  **2. Explicitation** *Guide Questions:* Gas to liquid (Condensation) • Can you think of examples of freezing in everyday life? • What happens to the particles during freezing? • How does the temperature affect the freezing process?	Lead a comparison discussion with the class, highlighting the similarities and differences between melting wax and evaporating water. Depending on time, this could be done in the classroom or could be a take home activity. Show students Pictures A and B. Ask them to share anything related to the pictures. Process their answers. Then, introduce the topic today which is the reverse of the order of the phase changes discussed in the previous day. Now it is Gas to Liquid to Solid. Show students the illustration below and have them hypothesize on the process of phase change from gas → liquid, and liquid → solid. You may ask guide questions provided.

	Liquid to solid (Freezing) • Where do we often see condensation occurring? • What factors contribute to condensation?  Source: https://th.bing.com/th/id/OIP.JylIwKRkyvPi4hx1J8tymQHaD2?rs=1&pid=ImgDetMain Key Points for Freezing: • Freezing is the process in which a liquid changes into a solid state when cooled. • It is the reverse process of melting, involving the removal of thermal energy from the substance. • During freezing, the particles in the liquid slow down and arrange themselves into a solid structure Key Points for Condensation: • Condensation is the process in which a gas changes into a liquid state when cooled. • It occurs when gas particles lose energy and come together to form liquid droplets. • Condensation commonly occurs when warm, moist air cools down, such as when warm air meets a cooler surface or when warm air rises and cools in the atmosphere. **3. Worked Examples** ○ Refer to Part A and B of LAS 3 of Quarter 1 Week 3 Worksheets for Science.	Process their responses and emphasize the key points. Make sure to clear out definition and use of terms like freezing, solidification (crystallization, if needed) which all pertains, to some level, liquid to solid change. Students will observe condensation and freezing as they perform Part A and B of LAS 3. Discuss the guide questions for Part A and B of LAS 3 to deepen understanding of freezing and condensation. Let the students share their data gathered to process the experimentation done. After discussion, let the learners answer Part C of the same activity sheet and discuss the answers for summarization.

	4. Lesson Activity ○ Refer to Part C and Synthesis part of LAS 3 of Quarter 1 Week 3 Worksheets for Science.	This can be done remotely if there is time constraint.
• **Making Generalizations**	**Week 3 - Day 4** **1. Learners' Takeaways**  *Guide Questions for students:* • What are the different phases of matter represented in the diagram? (Solid, liquid, gas) • What do the arrows represent? (Changes of state) • Looking at the arrows between solid and liquid, what general statement can you make about the relationship between temperature and melting/freezing? • Looking at the arrows between liquid and gas, what general statement can you make about the relationship between temperature and evaporation/condensation? Can you think of any real-life examples for each of these changes of state (melting, freezing, evaporation, condensation)?	Show the illustration to the class. Ask students to explain the illustration. Process student responses. Ask the guide questions. Use art of questioning and sort out misconceptions, if any, in this part. Ask the students these questions and let them reflect and share in class their thoughts and learnings verbally or written.

	2. Reflection on Learning • Think about the real-life examples we discussed for each phase change. Can you come up with your own examples from everyday life? • Why is understanding phase changes important? How does it apply to things we encounter in our daily lives? (cooking, weather patterns, etc.) • What are some strategies you used to better understand the phase change?	

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**1. Formative Assessment** **Choose the best answer for each question.** 1. Which of the following states of matter has particles arranged most closely together? a) Solid b) Liquid c) Gas d) All of the above 2. According to Kinetic Molecular Theory, what happens to the particles in a substance as its temperature increases? a) They move faster. b) They move slower. c) They stop moving. d) Their arrangement doesn't change. 3. What do you call the process of changing a solid into liquid by heating it? a) Melting b) Freezing c) Evaporation d) Condensation	When answering / checking the formative assessment, you can discuss the answers and the underlying concepts briefly. ***Answer Key for Formative Assessment:*** 1. a) Solid - Particles in solids are packed most tightly together. 2. a) They move faster. - Higher temperature means faster-moving particles. 3. a) Melting - This is the term used for a solid changing to a liquid. 4. c) Gas - Gas particles have the most space between them and can move most freely. 5. c) Evaporation - Evaporation happens at the surface of a liquid, while boiling involves the entire liquid. 6. a) Gain energy and move faster. - Melting requires adding thermal

	4. In which state of matter do particles have the most freedom of movement? a) Solid b) Liquid c) Gas d) All of the above have the same freedom of movement. 5. What term describes the process of a liquid changing into a gas at its surface? a) Melting b) Freezing c) Evaporation d) Condensation 6. What happens to the particles of a substance during melting? a) Gain energy and move faster. b) Lose energy and move slower. c) Don't change their energy or arrangement. d) Change their arrangement but not their speed. 7. Which of the following is NOT a factor affecting condensation? a) Pressure b) Temperature c) The color of the surface d) Presence of water vapor in the air 8. What is the opposite process of freezing? a) Boiling b) Melting c) Evaporation d) Condensation 9. What happens to the particles as a gas cool down and condenses? a) Gain energy and move faster. b) Gain energy and move slower. c) Lose energy and move closer together. d) Lose energy but maintain the same spacing.	energy, which increases particle movement. 7. c) The color of the surface - Color doesn't directly affect condensation, though a darker surface might radiate heat differently. 8. b) Melting - Melting is the process of a solid turning into a liquid, while freezing is the opposite. 9. c) Lose energy and move closer together. - Condensation involves losing heat, causing particles to slow down and come together as a liquid. 10. d) Condensation - Fog forms when water vapor in the air cools and condenses into tiny water droplets.

<table>
<tr><td></td><td colspan="3">10. What process is involved in everyday fog formation?
a) Melting
b) Boiling
c) Evaporation
d) Condensation

2. Homework (optional)</td><td>You may opt to give homework if you think the competency/ies is/are not yet mastered.</td></tr>
<tr><td rowspan="4">B. Teacher's Remarks</td><td>Note observations on any of the following areas:</td><td>Effective Practices</td><td>Problems Encountered</td><td rowspan="4"></td></tr>
<tr><td>strategies explored</td><td></td><td></td></tr>
<tr><td>materials used</td><td></td><td></td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td>others</td><td></td><td></td></tr>
<tr><td>C. Teacher's Reflection</td><td colspan="3">Reflection guide or prompt can be on:
▪ <u>principles behind the teaching</u>
What principles and beliefs informed my lesson?
Why did I teach the lesson the way I did?

▪ <u>students</u>
What roles did my students play in my lesson?
What did my students learn? How did they learn?

▪ <u>ways forward</u>
What could I have done differently?
What can I explore in the next lesson?</td><td></td></tr>
</table>