7

Lesson Exemplar for Science

Quarter 1

Lesson

1

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

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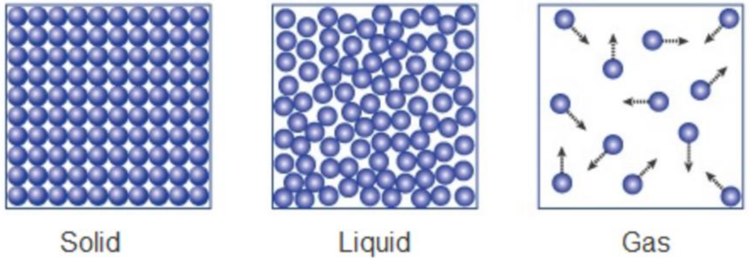
Every care has been taken to ensure the accuracy of the information provided in this material. For inquiries or feedback, please write or call the Office of the Director of the Bureau of Learning Resources via telephone numbers (02) 8634-1072 and 8631-6922 or by email at blr.od@deped.gov.ph.

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	Learners learn that the particle model explains the properties of solids, liquids, and gases and the processes involved in 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 Competencies:*** The learners shall be able to: 1. recognize that scientists use models to explain phenomena that cannot be easily seen or detected; and 2. describe the Particle Model of Matter as “All matter is made up of tiny particles with each pure substance having its own kind of particles.” ***Lesson Objectives:*** Learners shall be able to: 1. describe and explain the different models used by the scientist to explain phenomena that cannot be easily seen or detected; 2. describe particle model of matter; and 3. recognize that matter consists of tiny particles.
C. Content	Scientific Models and the Particle Model of Matter
D. Integration	Scientific Qualities • Critical Thinking: Students question and analyze the nature of matter and how models represent it. • Perseverance: Grasping the abstract concept of the Particle Model might take some effort. Encourage students to persevere and ask questions if they don't understand something.

II. LEARNING RESOURCES
• Worksheet for Science 7 Quarter 1 – Week 1

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
1. Activating Prior Knowledge	**Week 1 - Day 1** **1. Short Review: Models of Matter** Guide questions: 1. What do we call these representations of the molecules of solid, liquid and gas? 2. What is the importance of using scientific representations like this in learning science?  Say, *"There are many types of scientific models not just conceptual models for solid, liquid and gas. You will get to know them in the next activity/part of the lesson."*	Review the molecular arrangement of solids, liquids and gases tackled during elementary. Paste the image or prepare a slide deck for this. Ask the guide questions for processing.
2. Establishing Lesson Purpose	**1. Lesson Purpose** Building upon the review, the teacher will inform learners that for the remainder of the week, lessons will focus on scientific models, gradually transitioning towards the particle model of matter.	In this part of the lesson, please employ probing and art of questioning. Emphasize that too small or too big or too complex materials cannot always be seen and examined

	Essential Questions: 1. How can we visualize things that cannot be seen by the eye? 2. How can we visualize things that is too big, and complex be examined in actuality? **2. Unlocking Content Vocabulary** **Activity: Scavenger Hunt** Procedure: ○ Gather the students and explain that they will be embarking on a comprehensive vocabulary scavenger hunt to discover important terms related to scientific models and the particle model of matter. ○ Briefly review the purpose of the activity and emphasize that it's an opportunity to learn and have fun while reinforcing their understanding of key concepts. ○ Divide the class into small groups or pairs. Students will get random cards passed backwards from the teacher. ○ Provide each group with a list of all the vocabulary words they need to find. ○ Set a timer and let the groups begin their scavenger hunt to locate the hidden vocabulary cards. ○ Encourage students to read and discuss the meaning of each word once they find it. They can also brainstorm examples or real-life applications of the vocabulary words. *For discussion purposes:* ○ Once the scavenger hunt is complete, gather the students and review all the vocabulary words together. ○ Encourage students to share their findings and discuss the meanings and significance of each word. ○ Clarify any misunderstandings and provide additional explanations or examples as needed	face to face or in actual. Reiterate that representations or models are needed to further study things like that. Prepare the following in advance: ○ Index cards or small pieces of paper with vocabulary words written on them ○ Timer Write down each key vocabulary word related to scientific models and the particle model of matter on individual index cards or pieces of paper. *Possible key vocabulary words (You may choose from or add to the list below)* **Key Vocabulary:** • *Model* • *Particle* • *Matter* • *Diagram* • *Physical model* • *Computer simulation* • *Property* • *State of matter* • *Solid* • *Liquid* • *Gas* • *Melting*

		• *Freezing* • *Evaporation* • *Condensation* • *Sublimation* • *Deposition* • *Energy* • *Temperature*

3. Developing and Deepening Understanding	**Lesson 1: Introduction to Scientific Models**
	
	1. Explicitation: Think-Pair Share
	
	Procedure:
	1. Using a think-pair-share format, pose questions to the class, such as:
	o "What do you think a scientific model is?"
	o "Can you give an example of a scientific model you have encountered before?"
	o "Why do you think scientists use models to understand phenomena?"
	
	2. Students will discuss their ideas with a partner for a few minutes, then share their thoughts with the class.
	
	3. The following key concepts are emphasized:
	o *Scientists use models because reality, especially systems like Earth's climate, is complex and difficult to study directly.*
	o *Many factors influence complex concepts, for example climate, so it's impossible to consider all of them simultaneously, that is why models are necessary.*
	o *Models are useful tools that help scientists understand complex systems by allowing them to analyze and make predictions.*
	o *There are different types of models: physical models, conceptual models, and mathematical models.*
	    o *Physical models are smaller and simpler representations of a thing being studied. A globe or a map is a physical model of a portion or all of Earth.*
	    o *Conceptual models tie together many ideas to explain a phenomenon or event.*
		Engage your students in an interactive discussion to introduce the concept of scientific models.
		
		Call few volunteers to answer the questions. Gather ideas through classroom discussion and summarize the students' responses to get to the key concepts of the lesson.
		
		Summarize the students' responses and provide additional information, emphasizing that scientific models are simplified representations used by scientists to explain complex phenomena.
		You may use a prepared slide deck with images of samples of models or printed/cut out images.

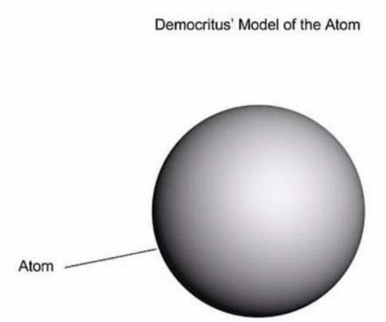
- *Mathematical models are sets of equations that consider many factors to represent a phenomenon. Mathematical models are usually done on computers.*
- *Simulation models use a digital prototype of a physical model to predict its performance in the real world*

- *Many models are created on computers because they can handle enormous amounts of data.*
- *Models can be used to test ideas by simulating specific parts of a system, making it easier for scientists to understand how certain factors affect each other.*
- *Models can also be used to make predictions about the future, with the best ones considering multiple factors.*
- *To assess the accuracy of a model, scientists often use past data to see if the model can accurately predict the present.*
- *Despite their usefulness, models have limitations because they are simpler than real systems and may not predict real-world behavior with absolute accuracy. However, careful construction and sufficient computing power can improve a model's accuracy.*

2. Worked Example: Thought-Provoke

Essential Questions:

1. Analyze the given model of the atom. Just by looking at it, in your own words, describe what an atom is.
2. How did the model help you understand how people see atom back in the days of Democritus? Is it helpful and easy to understand?



Present Democritus' Model of the atom, a model of the atom. Emphasize that the model serves as a conceptual model, illustrating the structure of the atom as how Democritus saw it way back, which is a solid sphere.

	3. Lesson Activity (Take Home Activity) For the activity worksheet, refer to LAS 1 in the Worksheet for Science 7 Quarter 1 – Week 1 **Week 1 - Day 2** **Lesson 2: Scientific Models in Focus: Atomic Models Through Time** **1. Explicitation: Recall** Some recall questions could include: ○ What is a scientific model, and why are they important in science? ○ How did scientific models help you in understanding and explaining atomic models? Could you share some of your answers in LAS 1 Part B? ○ Can you give an example of how scientific models are used in different fields of science? **2. Worked Example: Atomic Model Building** *Procedure:* 1. Divide the class into five groups, assigning each group a specific atomic model to focus on. 2. Each group will be tasked to synthesize their own understanding of the assigned atomic model based on the worksheet they have completed and any additional research they have conducted. 3. Build the physical model of the specific model assigned to you. 4. Be ready for presentation. **3. Lesson Activity** For the activity worksheet, refer to LAS 2 in the Worksheet for Science 7 Quarter 1 – Week 1	Students will complete the worksheet at home, and the completed worksheets will be utilized in the activity for the following day. Begin by asking students to reflect on their understanding of scientific models based on the previous lesson and the worksheet they completed at home. After allowing students to share their thoughts, segue into introducing today's lesson focus on atomic models. Explain that they will be diving deeper into the specific atomic models studied by scientists throughout history. You can assign models such as the Solid Sphere, Plum Pudding Model, Bohr Model, Rutherford Model, and Electron Cloud or Quantum Mechanical Model.

	Week 1 - Day 3 **Lesson 3: Particle Model of Matter** **1. Explicitation: Thought-Provoke** *Essential Questions*: o How do the characteristics of the Plum Pudding Model, the Bohr Model, and the Rutherford Model help us understand the behavior of particles within atoms? o What similarities and differences do you notice between the arrangement of particles within atoms and the behavior of particles in different states of matter?	Revisiting the last activity, stimulate prior knowledge by asking students these questions. After processing the responses and discussing the connections between atomic models and the particle model of matter, you can smoothly introduce the next concept on the particle model of matter.
	2. Worked Example: Tom's World Read the passage. *Tom is in his kitchen, preparing a cold drink on a warm summer day. He decides to make a refreshing iced tea and starts by filling a glass with ice cubes from the freezer. As he watches the ice cubes melt, he reflects on the particle model of matter:* *Tom begins by taking a few ice cubes out of the freezer. He notices that the ice cubes are solid and have a defined shape and volume. He explains that in their solid state, the water molecules in the ice are tightly packed together and arranged in a regular pattern* *Tom places the ice cubes in the glass and observes as they start to melt. He notices that as the ice cubes come into contact with the warmer air and the glass, they gradually begin to change from solid to liquid. He explains that the heat from the surroundings is transferring energy to the ice cubes,*	Ask students to read the story and answer the questions that follow. Read the story twice. On the first reading, let the learners listen to the whole story. On the second reading, the teacher or a handpicked student, whichever is applicable, can do what Tom does as the narrator read the story, this time, slower and with emphasis to the action being done.

	causing the water molecules to gain enough kinetic energy to overcome the attractive forces holding them together in the solid lattice. *As the ice cubes continue to melt, Tom observes that liquid water collects at the bottom of the glass. He explains that in the liquid state, the water molecules are still close together but have more freedom to move past one another. This illustrates another aspect of the particle model: the ability of particles in a liquid to flow and take the shape of their container.*	Make sure that the materials are given or instructed to be brought beforehand so the students could bring them.
	Processing Questions:	After reading and the demonstration, ask the students the questions. Each question has a concept to tackle please consider as you probe.
	○ How does the behavior of the water molecules in the ice cubes change as they transition from a solid to a liquid state?	Q1: This question prompts students to consider the changes in particle arrangement and movement as the ice cubes melt, highlighting the principles of the particle model of matter.
	○ Why does the temperature of the surroundings play a crucial role in the melting process of the ice cubes?	Q2: By asking this question, students can explore the concept of energy transfer and its impact on particle behavior, reinforcing the idea that external factors influence the state of matter.
	○ What evidence in Tom's observations supports the idea that particles in a liquid have more freedom to move than those in a solid?	Q3: This question encourages students to analyze Tom's observations and identify key indicators of particle behavior, such as the ability to flow and take the shape of their container, demonstrating an understanding of the particle model principles.
	○ How does the process of melting ice cubes illustrate the concept of phase transitions and the interplay between kinetic energy and attractive forces among particles?	Q4: By posing this question, students can explore the underlying mechanisms driving the transition from solid to liquid, linking the observations to fundamental principles of the particle model of matter.

	• *Key Concepts needed to be produced and processed during discussion:* ○ All matter is made up of tiny particles called atoms or molecules. ○ Atoms are the fundamental building blocks of elements, while molecules consist of two or more atoms chemically bonded together. ○ Particles are constantly in motion: ▪ In solids, particles vibrate in place. ▪ In liquids and gases, particles move from one location to another. ○ In solids, particles are closely packed with minimal space between them. ○ In liquids and gases, particles have more space between them. ○ As temperature increases, particle motion speeds up. ○ Higher kinetic energy leads to faster vibrations and movement of particles. **3. Lesson Activity** **Activity: The Sneaky Particle Party! (LAS 3)** *Procedure:* 1. The class will be divided into groups (probably 4-5). Each group will act out or perform one scenario below. • Ice Crystals: Each student will represent a single water molecule in ice. • Melting! Imagine the ice starts to warm up (increase in temperature). How do you think the water molecules would behave? • Liquid Water: As the ice melts completely, the water molecules move more freely. • Boiling! When the water boils, the molecules move much faster and escape into the air as steam.	Put/project images of the atomic models on the board as you ask the questions. The images must be labeled properly. Tell the students that atomic models are scientific models used to clearly see how an atom looks like. Then, to know how these atoms behave around other atoms, we look at what we call the particle model of matter. Discuss the concepts and resolve misconceptions. You will be the one describing the scenario. Arrange the students in a manner that they can see one another perform. Point at one group and let them perform what you will say. You can add to the description written here. Instruct students to stand close together, arms linked or holding hands, forming a rigid structure. This represents tightly packed and ordered water molecules in ice.

- Cooling Down: Imagine the water cools down (temperature decrease). How would the particles move now?

Processing Questions:

- How did your group move differently to represent a solid, liquid, and gas?
- What do you think happens to the space between the particles in each state?
- How does the movement of particles relate to the temperature of the matter?
- What principles of the particle model of matter can you share based on the activity done?

Rubric for Rating Group Performance

Criteria	Excellent (4 points)	Good (3 points)	Needs Improvement (2 points)	Unsure (1 point)
Ice Crystals	Students form a rigid structure with minimal movement, representing tightly packed water molecules.	Students form a structure with some movement, but it's not entirely rigid.	Students struggle to form a structure or movement is excessive.	Students don't participate or concept is unclear.
Melting	Students slowly increase movement while maintaining some connection, representing increased vibration of molecules.	Students increase movement but connection is inconsistent or excessive.	Movement is too rapid or students don't maintain any connection.	Students don't participate or concept is unclear.
Liquid Water	Students break formation and move freely within the designated area, bumping gently.	Students move freely but bumping is excessive or lacking.	Movement is restricted or students clump together excessively.	Students don't participate or concept is unclear.
Boiling	Students take a big jump apart with some leaving the designated area, representing rapid movement and escape of steam.	Students move apart but remain mostly within the area, or some leave but others don't.	Movement is insufficient or students don't leave the designated area.	Students don't participate or concept is unclear.
Cooling Down	Students gradually slow down and come closer together but maintain some space, representing slower movement of molecules.	Students slow down but movement is inconsistent or spacing is not clear.	Movement is too rapid or students clump together excessively.	Students don't participate or concept is unclear.
Engagement	All students actively participate and demonstrate understanding throughout the activity.	Most students participate and show some understanding.	Some students are not engaged or understanding is limited.	Students are not engaged or disruptive.

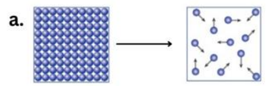
Instruct students to slowly begin to wiggle and vibrate in place, maintaining some connection with their neighbors. This represents increased movement of water molecules as ice starts to melt.

Instruct students to break their rigid formation and move around within the designated area, bumping gently into each other. This represents the loosely packed and flowing water molecules in a liquid.

Simulate this by having students take a big jump apart and move around freely throughout a larger space. Some students can even leave the designated area entirely, representing water molecules turning into steam.

Instruct students to gradually slow down their movements and come closer together, but not quite as close as the beginning when they were ice. Students should maintain a space between them, but slightly closer than when representing boiling water.

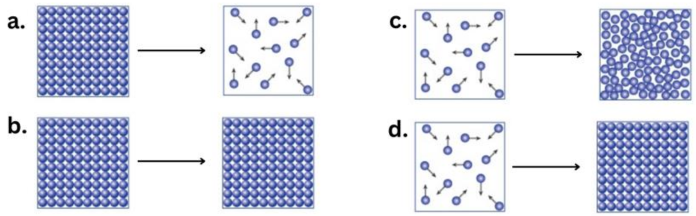
	Week 1 - Day 4 • For the activity worksheet, refer to LAS 3 in the Worksheet for Science 7 Quarter 1 – Week 1. Part 2 and synthesis will be accomplished as a take home activity.	Rubric for grading group performance could be found in the worksheet. After the performance, randomly ask each group one of the questions written. Discussion of Part 2 and synthesis shall be done on Day 4 together with the generalization, reflection and assessment.
4. Making Generalizations	**1. Learners' Takeaways** *Essential Questions:* 1. Explain how scientists use models to represent the unseen world 2. How does the particle model explain the difference between solids, liquids, and gases? **2. Reflection on Learning** Reflective question: How has this week's learning changed your perspective on seeing and imagining everyday materials that surround us?	Facilitate discussion and work on misconceptions if there are any. Ask students the questions written. You can always insert reflection in every lesson or activity if you think it is necessary not just at the end of the lessons. You can also decide on the mode – written or oral.

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	**Formative Assessment: Multiple Choice Questions** 1. Why do scientists use models? a) They are exact representations of reality. b) They only exist in computer simulations. c) They are always simple and easy to understand. d) They can be used to test ideas and make predictions. 2. What can be a limitation of scientific model? a) They are never updated or improved. b) They are all based on real-world data. c) They are only used in physics, not other sciences. d) They cannot perfectly capture all the complexities of a system. 3. What resembles the Plum Pudding Model of the atom? a) A tiny, solid ball with negative charges stuck on the outside. b) A complex mathematical equation describing electron behavior. c) A miniature solar system with planets orbiting a central nucleus. d) A positively charged sphere with negatively charges scattered throughout. 4. Why is the Plum Pudding Model helpful for scientists? a) It shows how atoms are mostly empty space. b) It shows electrons have specific energy levels. c) It shows how atoms are indivisible particles. d) It shows the nucleus is the most massive part of the atom. 5. What is the characteristic of solid particles as seen in its particle model? a) Moving freely and spread far apart. b) Arranged in a specific pattern but with large gaps. c) Vibrating in place with minimal space between them. d) Flowing around each other and constantly changing positions.	You can employ the assessments and can give additional guide questions if you think it is necessary. **Answer Key:** **Formative Assessment** 1. d) They can be used to test ideas and make predictions. 2. d) They cannot perfectly capture all the complexities of a system. 3. d) A positively charged sphere with negatively charged electrons scattered throughout. 4. a) It shows how atoms are mostly empty space. 5. c) Vibrating in place with minimal space between them. 6. d) More freedom to move and more space between them. 7. b) Moves farther away from each other 8.  9. a) Presence of orbitals 10. a) A song with lyrics full of subatomic particles and their charges

6. What can you say about the particles of liquid in contrast with a solid?
a) A predictable pattern of movement.
b) Less movement and are more tightly packed.
c) The same amount of movement and spacing.
d) More freedom to move and more space between them.

7. What happens to the particles of a material being heated?
a) Slightly compacted but can move
b) Moves farther away from each other
c) Gains more definite shape and compactness
d) Nothing happens because heat is not absorbed

8. Which of the following shows how particles behave when heated?



9. What can be seen in the physical model of the Bohr model of the atom?
a) Presence of orbitals
b) A cloud of electrons
c) A nucleus at the center
d) Nothing, just empty space

10. Which of the following CAN NOT be a scientific model for the atom?
a) A song with lyrics full of subatomic particles and their charges.
b) An image (picture, concept map, flowchart, etc.) that considers all laws of science
c) A round Styrofoam colored with parts representing electrons and other subatomic particles.
d) A computerized interactive game where you can put subatomic particles and guess the correct image for atom.

<table>
<tr><td></td><td colspan="3">2. Homework (optional)</td><td>You may opt to give homework if you think the competency is not yet mastered.</td></tr>
<tr><td rowspan="5">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="5"></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>