7

DepED
DEPARTMENT OF EDUCATION

# Lesson Exemplar in Science

Quarter 3
Lesson
7

**Lesson Exemplar for Science Grade 7**
**Quarter 3: Lesson 7 (Week 7)**
**SY 2024-2025**



**Development Team**

**Writer:**
- Darryl Roy Montebon (Philippine Normal University)

**Validator:**
- Alfons Jayson O. Pelgone (Philippine Normal University)

**Management Team**
Philippine Normal University
Research Institute for Teacher Quality
SiMERR National Research Centre

**SCIENCE (PHYSICS) /QUARTER 3/ GRADE 7**

| **I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES** | |
|---|---|
| **A. Content Standards** | 1. Scientists and engineers analyze heat to predict their effects on different materials.<br>2. Heat as an energy in transit and not as energy in a body to clarify misconceptions.<br>3. Graphing temperature readings accurate predictions about heat transfer.<br>4. The unique characteristic of heat as energy in transit explains natural systems and processes.<br>5. Scientists and engineers conduct innovative research on to find solutions to the current global energy crisis by creating new designs in housing insulations for a more efficient energy usage. |
| **B. Performance Standards** | *By the end of the Quarter, learners employ* scientific techniques, concepts, and models to predict the presence and direction of heat flow in a system. Represent their understanding on heat, temperature and thermal energy using scientific language, logical reasoning and illustrations. They use their curiosity, knowledge and understanding, and skills to propose solutions to problems related to heat and temperature. They explore how modern technologies might be used to overcome current global energy concerns. |
| **C. Learning Competencies and Objectives** | ***Learning Competency***<br>1. Describe heat and energy.<br>2. Differentiate Heat and Temperature through the concept of energy transfer.<br>3. Classify materials as insulators or conductors. |
| **D. Content** | Heat:<br>● Heat is a transfer of energy due to a temperature difference.<br>● It flows from regions of higher temperature to regions of lower temperature.<br>● The unit of heat is the joule (J) in the International System of Units (SI).<br><br>Temperature:<br>● Temperature is the degree of hotness or coldness of an object.<br>● Temperature is a measure of the average kinetic energy of the particles in a substance.<br>● The SI unit of temperature is the Kelvin (K), although Celsius (°C) and Fahrenheit (°F) are also commonly used scales for temperature measurement. |

| | |
|---|---|
| | Classification of materials: Insulators are materials with low thermal conductivity and are used to reduce heat transfer, while conductors have high thermal conductivity and facilitate heat transfer. |
| **E. Integration** | N/A |

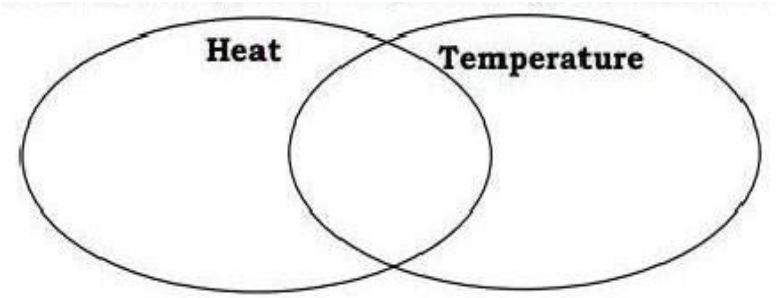
**II. LEARNING RESOURCES**

- Ateneo de Naga University Junior High School Physics Module
- Pabellon, J. and Tubal, G. (2000). Science and technology for a better life. Makati City: Diwa Scholastica Press Inc.
- Cervales, R. M. L. (2024) Inquirer Opinion. *Scorching heat: PH bearing the burden of climate crisis*. *Inquirer.net*. https://opinion.inquirer.net/173136/scorching-heat-ph-bearing-the-burden-of-climate-crisis

| **III. LEARNING RESOURCES** | | **NOTES TO TEACHER** |
|---|---|---|
| **A. Activating Prior Knowledge** | **1. SHORT REVIEW**<br>Let students recall their ideas on the terms HEAT and ENERGY. Let them complete the table below.<br><br>**See** \| **Think** \| **Wonder**<br>\| \| | Teachers may prepare one big diagram (organizer) and place it on the board. Let the students complete the See-Think-Wonder table.<br><br>Facilitate a class discussion on the See-Think-Wonder<br>1. What are their common ideas on heat and energy?<br>2. What are some similar questions that you have with your class? |

| | | |
|---|---|---|
| **B. Establishing Lesson Purpose** | **1. Lesson Purpose**<br>Have students read the following excerpt from a newspaper and let them answer the guide questions:<br>  <br>May 28, 2024 INQUIRER.NET Today's Paper<br>NEWS GLOBAL NATION BUSINESS LIFESTYLE ENTERTAINMENT TECHNOLOGY SPORTS OPINION<br>EDITORIAL COLUMNS VIEWPOINTS TALK OF THE TOWN LOVE.LIFE NEWSLETTER<br>LATEST OPINION<br>LETTER TO THE EDITOR<br>**Scorching heat: PH bearing the burden of climate crisis**<br>Philippine Daily Inquirer / 04:05 AM April 23, 2024<br>The recent string of humid days and scorching temperatures in Quezon City is a struggle we have endured for many days now. It makes me contemplate the even harsher conditions faced by those in areas with even higher heat indexes, like my hometown Roxas City, Capiz.Roxas City recorded a searing heat index of 44 degrees Celsius. Numerous areas nationwide also logged almost similar heat indexes, per the Philippine Atmospheric, Geophysical, and Astronomical Services Administration. In response to the health risks posed by extreme heat, mayors in various cities have taken the proactive step of suspending classes. However, this measure remains inadequate, especially for low-wage workers toiling under the sun.<br>EDITORS' PICK MOST READ<br>BUSINESS<br>Pasig River tollway still on the table, says Ang<br>GLOBALNATION<br>'Unlikely' to be more survivors from Papua New Guinea landslide<br>LIFESTYLE<br>The best music festivals in Asia in 2024<br>**Guide Questions:**<br>1. What problem is discussed in the article?<br>2. How will you describe heat? How is it different from temperature?<br><br>**2. Unlocking Content Area Vocabulary**<br>Facilitate a Heat and Energy Word Association Game to unlock some terms related to heat and energy. Present the following instructions to students.<br><br>Instructions for students:<br>1. You will be presented with a series of clues related to words associated with heat and energy.<br>2. Use your knowledge to guess the word related to each clue.<br>3. Try to guess as many words as you can within the given time limit.<br>4. Each correct guess will unlock the word and reveal it on the screen.<br>5. Have fun and challenge yourself to unlock all the words! | The Heat and Energy Word Association Game is a challenging, yet enjoyable activity designed to test your students' knowledge of words related to heat and energy. In this activity, they will unlock words by correctly guessing them based on clues provided.<br><br>Teachers may prepare a PPT or a set of flash cards for this activity.<br><br>Answers:<br>1. Joule or Calorie<br>2. Electrical energy<br>3. Conduction<br>4. Solar panel or Photovoltaic cell<br>5. Insulator<br>6. Convection<br>7. Sound energy<br>8. Kinetic energy<br>9. Thermometer<br>10. Radiation |

| | | |
|---|---|---|
| | Clues:<br>1. This unit measures the amount of heat.<br>2. Energy produced by the movement of electrons.<br>3. The transfer of heat through direct contact between objects.<br>4. This device converts sunlight into electricity.<br>5. A material that does not allow heat or electricity to pass through easily.<br>6. The process of transferring heat through the movement of particles in a fluid.<br>7. A form of energy produced by the vibration of particles.<br>8. The energy of motion.<br>9. A device used to measure temperature.<br>10. The flow of heat through space in the form of electromagnetic waves. | |
| **C. Developing and Deepening Understanding** | **SUBTOPIC 1: HEAT and TEMPERATURE**<br><br>**1. Explicitation:**<br>**Activity 1: Reading of a Story**<br>Let students read the following storyline and facilitate a class discussion afterwards.<br><br>**'Sorbetes' Adventure in Rizal Park**<br>(Author Unknown)<br><br>*It's a sunny afternoon in Rizal Park, and the air is filled with laughter and the sound of children playing. Families stroll along the pathways, taking in the sights and sounds of this iconic park. Amidst the bustling activity, there's a quaint little cart adorned with colorful umbrellas and a sign that reads "Sorbetes sa Rizal Park."*<br><br>*As you approach the cart, you're greeted by the friendly smile of Mang Romy, the sorbetes vendor. Behind him, rows of metal cylinders filled with ice cream flavors in vibrant hues beckon you to indulge in a sweet treat. The aroma of freshly made waffle cones wafts through the air, adding to the allure of the experience.*<br><br>*You join the queue of eager customers, eagerly anticipating your turn to sample the delights of sorbetes. As you wait, you strike up a conversation with fellow park-goers, sharing stories and laughter while soaking in the warm ambiance of the park.* | Background:<br>Rizal Park, located in the heart of Manila is a bustling hub of activity where locals and tourists alike come to enjoy the vibrant atmosphere and cultural attractions. Amidst the historical monuments and lush greenery, there's a small corner dedicated to a beloved Filipino tradition: *sorbetes*, the local version of "dirty ice cream." Let's explore a scenario of enjoying *sorbetes* in Rizal Park.<br><br>Activity Variation:<br>Role play activity may be facilitated.<br><br>Highlight the idea that heat is a form of energy similar to other |

| | | |
|---|---|---|
| | *Finally, it's your turn to place your order. You peek into the cart, marveling at the array of flavors available – from classic favorites like ube (purple yam) and mango, to more exotic offerings like buko pandan (coconut pandan) and langka (jackfruit). With a smile, Mang Romy scoops generous servings of your chosen flavors into a freshly made cone, expertly twirling it to perfection.*<br><br>*You take your first bite, savoring the creamy texture and rich flavor of the sorbetes. The cool sweetness provides a refreshing contrast to the warmth of the afternoon sun, making it the perfect indulgence on a hot day. As you stroll through the park, enjoying your sorbetes, you can't help but feel a sense of contentment and nostalgia, cherishing the simple joys of life in this bustling metropolis.*<br><br>*As the day draws to a close and the sun begins to set, you bid farewell to Rizal Park, your heart full of fond memories and your taste buds tingling with the lingering sweetness of sorbetes. Until next time, you look forward to returning to this beloved corner of Manila, where the tradition of sorbetes continues to bring joy to all who visit.*<br><br>Guide Questions:<br>1. How do you feel about the story?<br>2. Why are Filipinos fond of eating 'sorbetes'?<br>3. How is the concept of heat and temperature related to the story?<br><br>**2. Worked Example:**<br>Facilitate a guided inquiry to discuss heat and temperature. Let student complete the Venn diagram below to compare heat and temperature.<br><br>  <br> | energy forms the learners have studied prior.<br><br>**Key to Guide Questions:**<br>1. Student answers may vary.<br>2. Because of the hot weather in the country<br>3. The ice cream is at a lower temperature and the person eating it is at a higher temperature. Emphasize the concept of temperature difference.<br><br>Students should indicate the flow of heat transfer from ice arm to a person's hand, mouth, or tongue<br><br>The teacher may present some other examples to help the students think of their answers. Example, accidentally touching the pan while you are cooking.<br><br>**Key to Guide Questions:**<br>1. Heat is a form of energy and that it is transferred from one object to another because of varying temperature.<br>2. Heat is measured in joules. |

| | | |
|---|---|---|
| | **Guide Questions:**<br>1. What is heat?<br>2. How is it measured?<br>3. How will you describe heat transfer?<br>4. Is heat lost or gained? | 3. Heat transfer is the flow of energy from hot to cold temperature.<br>4. Heat loss or gain is often manifested as either feeling cold or warm. |
| | **3. Lesson Activity**<br><br>Group students and have them perform *Activity 2: Investigating Heat and Temperature.*<br><br>*Guide Questions:*<br>1. What happened to the temperature of the water in each glass when the spoon was transferred?<br>2. How did the spoon feel when you moved it from hot to room temperature water and then to cold water?<br>3. What can you conclude about heat transfer from your observations?<br>4. How did the temperature of the spoon change when placed in hot, room temperature, and cold water? | *Sample Answers:*<br>1. When the hot spoon was placed in the room temperature water, the water warmed slightly, and the spoon cooled down. When the spoon was transferred to the cold water, the cold water warmed slightly, and the spoon cooled down further.<br>2. The spoon felt initially very hot when taken from the hot water. After being placed in room temperature water, it became cooler but still warm. After being placed in cold water, it felt much cooler.<br>3. Heat transfers from the hotter object (the spoon) to the cooler object (the water) until thermal equilibrium is reached. This demonstrates the principle of heat conduction.<br>4. The spoon's temperature increased in hot water, remained warm in room temperature water, and decreased in cold water. |
| | **SUBTOPIC 2: Thermal Conductors and Insulators**<br><br>**1. Explicitation:**<br>Let students the story in *Activity 3. Reading a Story* and answer the guides questions that follow<br><br>**Maya's Thermal Adventure: Sorting Sorcery**<br>Author Unknown<br><br>Once upon a time, in a cozy little town nestled amidst rolling hills and lush forests, there lived a curious girl named Maya. Maya was known for her love of science and her insatiable thirst for knowledge. One sunny afternoon, as Maya sat in her room | |

surrounded by her toys and treasures, she embarked on an exciting quest - to sort her belongings into categories of thermal conductors and insulators.

With determination sparkling in her eyes, Maya began her sorting sorcery. She picked up her favorite toy, a shiny metal robot, and held it in her hand. Feeling its coolness against her skin, Maya declared it a thermal conductor, knowing that metals were excellent at transferring heat. Next, Maya reached for her soft, fluffy teddy bear and hugged it tightly. As the warmth enveloped her, Maya smiled and labeled her teddy bear as a thermal insulator, understanding that its plush fur trapped heat and kept her snuggly warm.

Moving on to her collection of pencils and pens, Maya observed their wooden bodies and decided they belonged in the thermal insulator category, as wood was not known for conducting heat efficiently. However, she held onto her metal pencil case and placed it the conductor section. She then came across her plastic toys and gadgets, noting their ability to feel neither hot nor cold to the touch. With a nod of approval, Maya categorized them as thermal insulators too.

As Maya sorted through her belongings, she marveled at the wonders of thermal conductivity and insulation. Each item told its own story, from the metallic chill of her robot to the comforting warmth of her teddy bear. With each object carefully categorized, Maya felt a sense of accomplishment wash over her.

As the sun began to set and the golden rays cast a warm glow through her window, Maya sat amidst her sorted treasures, feeling grateful for the knowledge she had gained. With a contented smile, Maya knew that her sorting adventure had not only taught her about thermal properties but had also ignited her curiosity to explore the wonders of science further.

And so, in the magical world of Maya's room, where toys and treasures came to life through the lens of science, the sorting sorcery of thermal conductivity and insulation became a tale to be cherished forevermore.

**Guide Questions:**

1. Complete the diagram below to show how Maya sorted her toys:

| Toys that are conductors | Toys that are insulators |
|---|---|
| | |

2. What are Maya's bases for sorting her toys as to conductors or insulators? Are her basis correct or not? Why?
3. How will you describe thermal conductors? Thermal insulators?

**2. Worked Example**

Facilitate a class discussion on the following concepts on **Thermal Conductors and Insulators**

- Those materials that conduct heat well are called ***thermal conductors,*** and those that conduct heat poorly are known as ***thermal insulators.*** Most metals are excellent thermal conductors; examples of metals are nails, keys, coils, wires, and doorknobs. On the other hand, wood, glass, rubber, cloth and most plastics are common thermal insulators.
- Thermal insulators have many important uses:
    - Most new housing construction incorporates thermal insulation in attics and walls to reduce heating and cooling costs.
    - The wooden or plastic handles on many pots and pans reduce the flow of heat to the cook's hand.
    - Moreover, for drivers of jeepneys, water is a cheap and good insulator lubricant for their engine not to overheat in their day-to-day occupations and travel.
- On the other hand, thermal conductors are present in radiators and heaters in houses that rely on efficient transfer heat.
    - Copper pipes are commonly used in radiators to distribute hot water or steam throughout the house.

- In the kitchen, thermal conductors like stainless steel, aluminum, and copper are used for pots and pans. These materials quickly distribute heat, allowing efficient cooking.
- Also in public transport trains, buses, and subways use thermal conductors to manage temperature. For instance, aluminum is used in train carriages because it conducts heat well, ensuring uniform heating or cooling.

Let students give their own examples for the uses of insulators and conductors.

**3. Lesson Activity**

**Activity 4: Classifying materials as to Conductor or Insulator**

**Objective**: Classify materials as thermal conductors or insulators by touching.

**Materials:**
The following materials must be brought to the classroom and placed on a table at least one hour before the start of classes. (Group activity)

| | | | | |
|---|---|---|---|---|
| Metal spoon | Beaker | aluminum ladle | Ballpen | P10 coin |
| Plastic spoon | Wooden spoon | Iron nail | Acetate | Steel bar |
| Porcelain mug | Floor Tile | Handkerchief | | Cardboard |

Procedure:
1. Lay down all the materials into a table.
2. Using your hand hold the material in your hand for about 5 seconds, and record what you feel (cold, neutral, warm) by checking the appropriate column in the table.

| Material | Sensation | | | Remarks | |
|---|---|---|---|---|---|
| | Cold | Neutral | Warm | Conductor | Insulator |
| 1.Metal spoon | | | | | |
| 2.Plastic spoon | | | | | |
| 3.Porcelain mug | | | | | |
| 4.Beaker | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 5.wooden spoon | | | | | |
| 6.Floor tile | | | | | |
| 7.Aluminum ladle | | | | | |
| 8.Iron nail | | | | | |
| 9.Handkerchief | | | | | |
| 10.Plastic Ballpen | | | | | |
| 11.Acetate | | | | | |
| 12.Cardboard | | | | | |
| 13.P10 coin | | | | | |
| 14. Steel bar | | | | | |

3. Let another member of the group hold the material for 10 seconds or more after the first student, Record the sensation felt by checking the appropriate column in the table. All members of the group should hold the materials. The column with the most frequency will be considered the answer for the group (majority prevails). Discuss among your group your final answer.

**Guide questions:**

1. Which materials are conductors? Which Materials are insulators?
2. How did you classify materials as to insulators and conductors?
3. Are your sensations reliable for determining if a material is a conductor insulator? If not, what process can be best done?
4. Why is it important to know if a material is insulator or a conductor?

Answer Key:

1.

*Conductors:* Metal robot, Pencil case

*Insulators:* Teddy Bear, Pencils and Pens, Plastic containers

2. Based on the characteristics of the objects

3. Students answer may vary

Answer Key:

| Material | Sensation | | | Remarks | |
|---|---|---|---|---|---|
| | Cold | Neutral | Warm | Conductor | Insulator |
| 1.Metal spoon | / | | | / | |
| 2.Plastic spoon | | / | | | / |
| 3.Porcelain mug | | / | | | / |
| 4.Beaker | | / | | | / |
| 5.wooden spoon | | / | | | / |
| 6.Floor tile | / | | | / | |
| 7.Aluminum ladle | / | | | / | |
| 8.Iron nail | / | | | / | |
| 9.Handkerchief | | / | | | / |
| 10.Plastic Ballpen | | / | | | / |

| | | |
|---|---|---|
| | | 11.Acetate \| \| / \| \| \| / <br> 12.Card board \| \| / \| \| \| / <br> 13.P10 coin \| / \| \| \| / \| <br> 14. Steel bar \| / \| \| \| / \| <br><br> Note: The materials in the table are in thermal equilibrium with the room for they have been placed in the room for a long time already (around an hour or more).<br><br> Sample answers:<br><br> 1. by observing the characteristics of the materials using senses<br> 2. No; perform tests<br> 3. for application in real life |

| **IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION** | | **NOTES TO TEACHERS** |
|---|---|---|
| **A. Evaluating Learning** | **1. Formative Assessment**<br><br>1. What is heat?<br>a) A measure of temperature<br>b) A form of energy transfer due to temperature differences<br>c) A measure of the kinetic energy of particles<br>d) A unit of temperature measurement<br>2. Heat flows from regions of _____ temperature to regions of _____ temperature.<br>a) higher, higher<br>b) lower, higher | Answer Key:<br>1. B<br>2. C<br>3. D<br>4. A<br>5. B<br>6. B<br>7. D<br>8. B<br>9. B |

| | | |
|---|---|---|
| | c) higher, lower<br>d) lower, lower<br>3. What is the unit of heat in the International System of Units (SI)?<br>a) Kelvin (K)<br>b) Celsius (°C)<br>c) Fahrenheit (°F)<br>d) Joule (J)<br>4. Which of the following statements is true about temperature?<br>a) It is a measure of the average kinetic energy of particles in a substance.<br>b) It is a measure of the potential energy of particles in a substance.<br>c) It is a measure of the volume of a substance.<br>d) It is a measure of the density of a substance.<br>5. Which of the following materials is an insulator?<br>a) Metal<br>b) Glass<br>c) Copper<br>d) Aluminum<br>6. What is the primary purpose of insulators?<br>a) To facilitate heat transfer<br>b) To reduce heat transfer<br>c) To conduct electricity<br>d) To absorb heat<br>7. Which of the following materials is a conductor?<br>a) Rubber<br>b) Plastic<br>c) Wood<br>d) Copper<br>8. What is the characteristic of a good conductor?<br>a) Low thermal conductivity<br>b) High thermal conductivity<br>c) Low density<br>d) Low melting point<br>9. What is the characteristic of a good insulator?<br>a) High thermal conductivity<br>b) Low thermal conductivity<br>c) High density | 10. D |

<table>
<tr><td></td><td colspan="3">d) High melting point<br>10. How does an insulator differ from a conductor regarding heat transfer?<br>a) Insulators transfer heat more easily than conductors.<br>b) Conductors reduce heat transfer, while insulators facilitate it.<br>c) Insulators have high thermal conductivity, while conductors have low thermal conductivity.<br>d) Conductors have high thermal conductivity, while insulators have low thermal conductivity.<br><br>2. Homework (Optional)</td><td></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:<br>▪ <u>principles behind the teaching</u><br>What principles and beliefs informed my lesson?<br>Why did I teach the lesson the way I did?<br><br>▪ <u>students</u><br>What roles did my students play in my lesson?<br>What did my students learn? How did they learn?</td><td>Teacher's reflection in every lesson conducted/ facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC sessions.</td></tr>
</table>

| | | |
|---|---|---|
| | ▪ *<u>ways forward</u>*<br>*What could I have done differently?*<br>*What can I explore in the next lesson?* | |