# Week 8

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| **Learning Planner** | | | | | | | |
| **Subject** | Physics | **Week** | 8 | **Duration** | 240 minutes | **Form** | 1 |
| **Strand** | Energy | **Sub-Strand** | Heat | | | | |
| **Content Standard** | Demonstrate knowledge and understanding of principles of Thermometry | | | | | | |
| **Learning Outcome(s)** | Apply the principles of thermometry to design a thermometer. | | | | | | |
| **Learning**  **Indicator(s)** | 1. Explain thermometric substances and their associated characteristics. 2. Describe the features and uses of different types of thermometers. | | | | | | |
| **Essential Question(s)** | 1. What are some common substances in the local environment that could be described as thermometric?  2. What are the features that differentiate one type of thermometer from the other?  3. How can learners be taught to use thermometers responsibly and ethically, considering issues like privacy and safety in healthcare, industry or research settings? | | | | | | |
| **Pedagogical Strategies** | Talk for learning (discussions, ppt presentations), Experiential learning (experiment) | | | | | | |
| **Teaching & Learning Resources** | Laboratory thermometers, Beakers, Water, Heaters, power sources, Audio-visuals, Internet, Reference books, Projectors. | | | | | | |
| **Key Notes on Differentiation** | | | | | | | |
| **Learning Tasks**  **Lesson 1:**  **1.** Define thermometric substances.  **2.** List thermometric substances.  **3.** Explain characteristics of some thermometric substances.  **Lesson 2:**  **1.** List different types of thermometers.  **2.** State features of different types of thermometers.  **3.** State advantages and disadvantages of different types of thermometers.  **Pedagogical Exemplars**  **Lesson 1:**  1.Using a class discussion, learners are encouraged to recall their knowledge of heat and  temperature, laying the foundation for the upcoming hands-on activities and allowing learners  to connect new information with existing understanding.  **2.** Provide a list of common thermometric substances such as mercury, alcohol, water and  bimetallic strips. Ask learners in groups to research and identify the unique properties of each  substance that make them suitable for measuring temperature changes. These experiments can  also be demonstrated by the teacher or been shown in videos.  4.Individually, learners should research different types of thermometers (including liquid in glass thermometers, resistance thermometers, thermocouples, gas thermometers), examining their features, uses, advantages, disadvantages, safety considerations, environmental impacts. Their findings could be presented orally or be in a written format to submit.  **Lesson 2:**  a). Guide the first group to set up their PowerPoint slides and present their findings on the types, features, advantages and disadvantages of thermometers. Engage the class in a discussion on the presentation.  b). In a whole – class discussion, guide learners to perform computations on finding unknown temperatures and other quantities in the types of thermometers discussed.  **Key Assessment**  **Level 1:** Define thermometric substances.  **Level 1:** List at least three thermometric substances.  **Level 2:** State the characteristics of at least two thermometric substances.  **Level 3:** Discuss the advantages and limitations of thermocouples as temperature measuring devices and provide examples of scenarios where they are preferred. | | | | | | | |
| **Keywords** | thermometric substances, thermometers, features | | | | | | |

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| **Lesson 1: THERMOMETRIC SUBSTANCES** | |
| **Main Lesson drawing on Concepts, Skills and Competencies to reinforce as in the Subject Teacher Manual** | |
| ***Teacher Activity*** | ***Learner Activity*** |
| **Starter *Activity (10 minutes)***  Using a class discussion, learners are encouraged to recall their knowledge of heat and  Temperature. The discussion is guided by the questions:   1. ***What is temperature of a body?*** 2. ***What is the difference between temperature and heat?*** 3. ***What is the SI unit of temperature and heat?*** 4. ***How can the temperature of a body be measured?*** | |
| ***Introductory Activity (15minutes)***  I.In their mixed ability groupings, show learners videos in which;  a). a clinical thermometer is used to measured the temperature of a sick patient b). a laboratory thermometer is used to measure the temperature a liquid  II. After watching the video, task each group to describe their observations guided by the following questions.  a). what is the temperature of the sick patient and the liquid? b). can the thermometer used to measure the temperature of the sick patient be used to measure the temperature of the liquid and vice versa? Briefly explain your answer.  b). what mechanism is used by both thermometers to measure temperature?  ***Activity 1 (40 minutes)***  I. Engage a few groups in presenting and discussing their responses to the class.  II. In their groups, guide the learners to discuss the meaning of thermometric substances and list down at least three examples.  ***Activity 2 (40 minutes)***  I. Using their tablets or text books, task the groups to explain the characteristics of the thermometric substances they have already listed, stating their advantages and disadvantages.  II. Provide each group with a thermometer and boiling water to verify that the boiling point of water is 100oC. | ***Introductory Activity (15minutes)***  I. In your groups discuss your observations from the two videos and answer the questions given.    ***Activity 1 (40 minutes)***  I. Participate in presenting and discussing the responses from your colleagues to the class.  II. Discuss among yourselves in your groups the meaning and examples of thermometric substances.  ***Activity 2 (40 minutes)***  I. Using your tablets or text books, discuss in your groups to explain the characteristics of the thermometric substances you have already listed, stating their advantages and disadvantages.  II. With the help of the given thermometer verify that the boiling point of water is 100oC. |
| **Assessment DoK aligned to the Curriculum and Subject Teacher Manual** | |
| ***Level 3***   1. *Discuss the processes involved in calibrating a liquid – in – glass thermometer at the lower and upper fixed points.* 2. *Discuss why water is not a good thermometric liquid.* | |
| **Lesson Closure** | |
| ***Activity (15 minutes)***   1. *End lesson by summarizing main points of the lesson* 2. *Students asks questions to clarify as misunderstanding and consolidate what is learnt* 3. *Give learners assignment on the types of thermometers and their mode of operation* | |
| **Reflection & Remarks** | |
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| **Lesson 2: THERMOMETERS** | |
| **Main Lesson drawing on Concepts, Skills and Competencies to reinforce as in the Subject Teacher Manual** | |
| ***Teacher Activity*** | ***Learner Activity*** |
| **Starter *Activity (10 minutes)***  Start the lesson with a short quiz;  1. What is a thermometric substance?  2. List three thermometric substances.  3.Explain one reason alcohol may be preferred to mercury as a thermometric substance. | |
| ***Introductory activity (25 minutes)***  I. Guide the first group to set up their PowerPoint slides and present their findings on the types of thermometers. II. Engage the class in a discussion on the presentation.  ***Activity 1 (25 minutes)***  I. Guide the second group to set up their PowerPoint slides and present their findings on the features of the types of thermometers. II. Engage the class in a discussion on the presentation.  ***Activity 2 (25 minutes)***  I. Guide the third group to set up their PowerPoint slides and present their findings on the advantages and disadvantages types of thermometers. II. Engage the class in a discussion on the presentation.  ***Activity 3 (25 minutes)***  In a whole – class discussion, guide the learners to perform computations on finding unknown temperatures and other quantities in the types of thermometers discussed. | ***Introductory activity (25 minutes)***  I. Set up your PowerPoint slides and present your findings on the types of thermometers.  II. Engage the class in a discussion on the presentation.  ***Activity 1(30 minutes)***  I. Set up their PowerPoint slides and present their findings on the features of the types of thermometers. II. Engage the class in a discussion on the presentation.    ***Activity 2 (25 minutes)***  I. Set up your PowerPoint slides and present your findings on the advantages and disadvantages types of thermometers.  II. Engage the class in a discussion on the presentation.  ***Activity 3 (25 minutes)***  Perform computations on finding unknown temperatures and other quantities in the types of thermometers discussed. |
| **Assessment DoK aligned to the Curriculum and Subject Teacher Manual** | |
| ***Level 3***  Discuss why it is more reliable to use a thermometer than the human palm to determine the temperature of a body | |
| **Lesson Closure** | |
| ***Activity (15 minutes)***   1. *End lesson by summarizing main points of the lesson* 2. *Students asks questions to clarify as misunderstanding and consolidate what is learnt* 3. *Give learners assignment* | |
| **Reflection & Remarks** | |
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