

5

Lesson Exemplar for Science 5

Quarter 1

Week

8

Lesson Exemplar for Science Grade 5
Quarter 1: Week 8
SY 2023-2024

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LESSON EXEMPLAR TEMPLATE

SCIENCE/QUARTER 1/GRADE 5

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	<i>The learners learn that:</i> 1. Scientists identify three states of matter based on shape and volume. 2. Temperature can cause changes of state. 3. Planned simple scientific investigations require several steps and processes. 4. An understanding of matter can be applied to solve real world problems.
B. Performance Standards	<i>By the end of the quarter, learners:</i> Describe three states of matter based on properties of shape and volume and identify heat as being involved in changes of state. They plan a simple scientific investigation following appropriate steps and using units such as milliliters, liters, grams, kilograms, and degrees Celsius for measuring.
C. Learning Competencies and Objectives	Learning Competency: The learners plan simple scientific investigations in answering questions, such as “Do gases (like air) or liquids (like water) have mass?”, using appropriate simple science equipment, such as a balance, and a thermometer, with appropriate units. <i>Lesson Objectives:</i> The learners will be able to: 1. record measurements using mechanical and/or electronic balances, and liquid-in-glass thermometers and/or digital thermometers; 2. identify the appropriate science equipment to use for a given test; and 3. perform simple scientific investigation to get the measurement (mass) of a given sample of air and liquid water.
D. Content	1. Using Balances and Thermometers a. Using a triple beam balance and an electronic analytical balance b. Using a liquid-in-glass thermometer and a digital laboratory thermometer 2. Planning Simple Scientific Investigations Using Appropriate Simple Science Equipment a. Identifying the equipment needed based on the nature of the test b. Proving gases and liquids are matter by taking their mass.

E. Integration	Environmental Awareness: Relate how climate change may make temperatures too warm or too cold for humans to live. Safety: When conducting experiments even with common materials, precaution and safety procedures must still be followed. Accountability and Responsibility: Learners should understand that different materials can be beneficial if use in the right and proper way and can be harmful if used otherwise. Measuring Skill (Science Process Skill Focus): Value of Precision
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II. LEARNING RESOURCES

CONTENT

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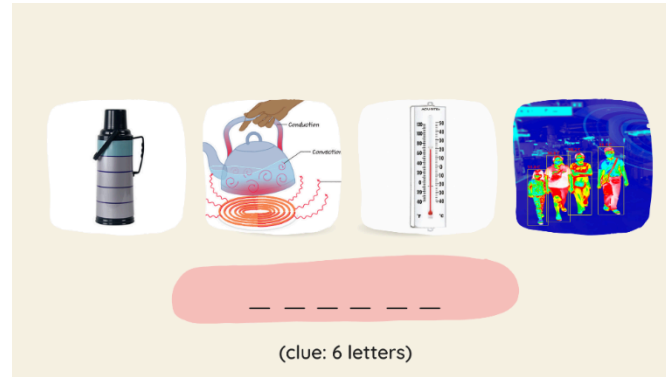
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III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	Week 8 – Day 1 1. Short Review Recall what you have learned about the different units of measurement we use in the laboratory. <i>Processing Questions:</i> 1. Can anybody from the class recall for me what were the different units of measurement that we learned about? - The units of measurement that we learned are the <i>milligrams</i>, <i>grams</i>, <i>kilograms</i>, and <i>degrees Celsius</i>, a type of a centigrade scale. 2. What physical quantity do grams, milligrams, and kilograms describe? - All of them describe mass. As you may recall, the mass of an object is the amount of matter it has. 3. On the other hand, what physical quantity does the degrees Celsius describe? - It describes temperature. As you may know, the temperature of an object tells us how cold or how hot an object is. Lastly, let us go back to milligrams, grams, and kilograms. 4. Which among the three measurements describes the greatest amount of mass: one milligram, one gram, or one kilogram?	<i>Activating Prior Knowledge</i> Have the students recall what they have learned about units of measurement and how they are used. The use of simple science equipment will rely on how well they understand what a unit is and how it is used to describe different physical quantities. Make this part an interactive discussion by allowing students to answer the processing questions. Sample answers are given already for your reference.

	- One kilogram has the greatest amount of mass, as one kilogram is equal to one thousand (1000) grams. On the other hand, the milligram has the least amount of mass, as it contains only one-thousandth ($\frac{1}{1000}$) the mass of a gram. Now that you are all set, we can now learn about the different simple science equipment that we use in the laboratory for measurement.	
B. Establishing Lesson Purpose	1. Lesson Purpose Say, “Class, have you ever joined your parents on a trip to the market before?” Processing Questions: - Whenever your parents buy fish, meats, vegetables, and rice, what do the vendors do to these items before mentioning their price? - The vendors weigh the items on a scale first. These weighing scales allow vendors to know how much of the item is being bought (in mass) and for how much it can be sold for (in cash). Now, I also want you to recall the times when you have had a fever. - What did your parents use at home to check your temperature? How about what a nurse or doctor used to check your temperature? - Using the back of our hand if someone is warm or cold, but it is not enough to tell us whether someone is sick or not. They use thermometers to accurately measure temperature. In the same way, you will all learn how to operate different these kinds of equipment to find out how much mass something has, and how hot or cold it is. 2. Unlocking Content Vocabulary: 4 Pics 1 Word <i>General Instructions for learners:</i> On the screen, your teacher will be flashing four pictures for each word, and you must guess the correct word based on the clues given.	<i>Lesson Purpose</i> Discuss the processing questions and the answers in a light manner. Have the students recall instances where they have seen measuring tools before, such as in the market, at the sari-sari store, or even at the clinic. Relate their experiences to the lesson this way. <i>Unlocking Content Vocabulary</i> Prepare the visual aid / slide deck for this activity beforehand.



1.



2.

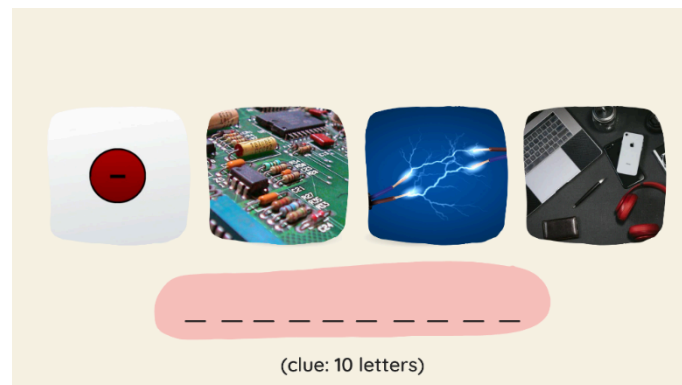


3.

Answer Key

1. THERMO
2. BALANCE
3. DIGITAL
4. ELECTRONIC

Do not hesitate to give the students hints if they are having difficulty in a given item.



4.

(clue: 10 letters)

C. Developing and Deepening Understanding

Lesson 1: USING BALANCES AND THERMOMETERS

1. Explication

Say, “The units of measurement that you learned in previous lessons are used to describe the physical characteristics of an object. Milligrams, grams, and kilograms are used to describe how much mass an object has, while degrees Celsius is used to describe how hot or how cold something is.

Processing Question:

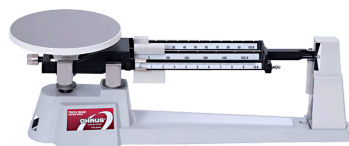
1. In this sense, what can we use to measure the mass of an object?

Balances are instruments that are used to measure mass. Balances can either be *mechanical* or *electronic*. A mechanical balance only uses springs, levers, and reference weights, and does not need electricity at all to operate. An object is placed on the platform of a mechanical balance, and the said reference weights are then moved around until both the object being weighed and the reference weight are “balanced,” which will give us the mass of the object. An example of a mechanical balance that works this way is the *triple-beam balance*.

Explication

If applicable, bring the actual instruments with you, so that the learners will see the instruments in action rather than just being shown images of them and being told what to do. It would help to demonstrate how they work by putting objects on the balances and recording measurements. In the case of thermometers, the same could be done by taking the temperature of a sample liquid.

Facilitate an interactive discussion for this part. Prepare a visual aid / slide



A triple beam balance. Note the slidable weights on the beams.

On the other hand, an electronic balance, as the name suggests, uses electronics in the form of a simple computer. A person can place an object on the pan of an electronic balance and determine the mass just by looking at the LCD screen of the balance. The computer does all the balancing and measuring for you. Examples of electronic balances are *top-loading balances* and *analytical balances*. An analytical balance can measure much smaller masses than a top-loading balance.



A top-loading balance (left) and an analytical balance (right). Note how many more zeroes the analytical balance has.

These balances, being high precision instruments used to measure very light substances in the laboratory, express mass in grams (g) and milligrams (mg). To measure objects with greater mass in kilograms (kg), bigger scales are used. *Bathroom scales* are the scales that people use to measure their own mass. *Physician scales* are used in clinics, while *floor scales* can be used to measure the mass of packages.



From left to right: a bathroom scale, a physician scale, and a floor scale.

deck to properly show the images and key concepts. You can provide a printed/hard copy of the key concepts so the students will have a reviewer.

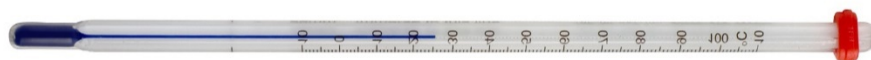
Use the processing questions for discussion. Sample answers are given for your reference.

For this part, you can insert the importance of precision in terms of measurement. Discuss the zeroes reflected for both balances.

2. In this sense, what can we use to measure the temperature of an object?

Thermometers are instruments used to measure the temperature of an object. There are two types of thermometers commonly used in the laboratory: *liquid-in-glass thermometers* and *digital thermometers*.

Liquid-in-glass thermometers, as the name suggests, are thermometers that have liquids encased in a glass tube. Two of the liquids that are commonly used in these thermometers are *mercury* and *ethanol*, with *ethanol* being regarded as the safer alternative. When exposed in a warm area, the liquid inside the glass tube expands—in a cool area, the liquid shrinks. The rising of the liquid in the tube corresponds to an increase in temperature, while the lowering of that same liquid corresponds to a decrease in temperature.



A laboratory-grade liquid-in-glass thermometer. The liquid in the glass tube is dyed blue for visibility.

Digital thermometers, like electronic balances, make use of electronics in the form of simple computers. It calculates the temperature of an object and show the results on its LCD screen. Due to this, digital thermometers are also faster at reading temperature than liquid-in-glass thermometers.



A laboratory-grade digital thermometer. The power button is first pressed to turn it on, then its probe is immersed in the substance to measure its temperature.

3. Answer LAS1 Science 5 Week 8 Worksheet. Did you identify the instruments correctly?

In this part, if you can provide a mercury thermometer for comparison, it is much better.

If, for instance, some of the needed instruments are not available for actual viewing and use, download videos showing how to use them. Supplement them with images.

Allow learners to answer LAS1. Depending on time, they can answer it in class or as a homework.

Answers:

1. Triple beam balance.
2. Top-loading balance.

Week 8 – Day 2

2. Worked Example: Hands On Activity

Say, “For this part of the lesson, you will now be practicing how to use these different scales and thermometers. Let us start with the balances to help us measure the mass of a given object.”

To use the triple beam balance, do the following:

- a) Move the sliders (reference weights) on each of the beams to the leftmost side so that the balance reads zero. The indicator on the far right must also read zero.
 - i. If the indicator does not read zero, adjust it by turning the screw under the balance pan.
- b) Place the object to be measured on the pan. You will see that the indicator will go above the zero mark.
- c) To start measuring the mass, first move the biggest slider (the 100-gram slider) until the indicator is aligned just slightly above—if not exactly on—the zero mark on the far right. The arrow marks on the sliders that points to the number it lands on indicates the mass of the object.
 - i. If the slider causes the indicator to be aligned exactly on the zero mark, you may skip steps d) and e).
- d) Next, move the second largest slider (the 10-gram slider) until the indicator is also just below—if not exactly on—the zero mark on the far right.
- e) Move the smallest slider until the indicator falls exactly at the zero mark.
- f) Add the masses recorded on each of the beams. This will give you the overall mass of the object.

Say, “This time, let us try measuring the mass of an object using an analytical balance.”

The steps in using an analytical balance are as follows:

- a) Clean the surface of the balance. Make sure that your balance is on a flat surface and levelled.

3. Analytical balance.

4. Liquid-in-glass thermometer.

5. Digital thermometer.

Let the learners hold, touch, and manipulate the actual instruments. If not available, look for a simulation to do this activity. Be resourceful in conducting this activity as it is very important to get the target competency.

For the balances, you can discuss only one, in case there is time constraint and lack of equipment.

Provide a triple beam balance for this part. Demonstrate first, step by step, and then call 1-2 volunteers to manipulate the balance.

Provide an analytical balance (if possible and available). Demonstrate first,

	i. To check the levelling, look at the levelling bubble and make sure that the bubble is at the center of the circle. If the bubble is not centered, adjust by turning the levelling screws on the bottom at the back of the balance. b) Close the chamber doors and press the power button. A row of zeros will appear on the LCD screen, indicating that it is now ready for use. c) Place the weighing container on the balance pan. Close the chamber doors after you do so. d) As the weighing container has a mass of its own, you need to tare it. “Taring” is the process of taking the mass of the weighing container into account so that the mass of the substance you want to measure is what you directly get. To tare, just press the “tare” button on the control panel of the balance. e) Slowly add the sample that you want to measure the mass of onto the weighing container. You may remove the weighing container from the balance first to make it easier to pour the sample. provided that no one touches the controls of the balance to avoid removing the tare. f) With the sample and container on the pan, close the chamber doors and look at the LCD screen to get the mass of sample. <i>Say, “Alright, all of you are now familiar with how to use the two balances. This time, let us learn how to use the two types of thermometers: the liquid-in-glass thermometers and digital thermometers.”</i> To use a liquid-in-glass thermometer, do the following: a) Calibrate the liquid-in-glass thermometer by lightly flicking or tapping the thermometer with your finger. This is to ensure all of the liquid will fall to the bottom of the thermometer. i. DO NOT flick the thermometer too hard. DO NOT shake the thermometer. Doing these two actions will damage the thermometer. b) Place the thermometer in the sample. Make sure that the bulb of the thermometer is immersed in the sample. DO NOT let the bulb touch the	step by step, and then call 1-2 volunteers to manipulate the balance. For the thermometers, you can discuss only one, in case there is time constraint and lack of equipment. Provide a liquid-in-glass thermometer (if possible and available). Demonstrate first, step by step, and then call 1-2 volunteers to manipulate the thermometer.
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	base or the wall of the container. Keep it suspended by holding the thermometer up. c) Watch the liquid rise (if the sample is hot) or shrink (if the sample is cold). Once the liquid stops moving and stabilizes, record the measurement. i. Depending on the graduation of your thermometer, you may have to read it in two (0.00) or three (0.000) decimal places. d) Remove the thermometer from the sample and wash it with deionized water/distilled water before using it again or putting away. Say, “This time, I will teach you how to use a digital thermometer. The steps in using one are as follows:” a) Hold the digital thermometer on its plastic parts. DO NOT touch the metal part of the thermometer while you do a measurement. b) Press the power button on a digital thermometer. The LCD screen will flash to indicate that it has been turned on. a. If there is a switch or button that allows you to change the temperature scale from degrees Celsius to Fahrenheit, make sure to set the scale to Celsius. c) Submerge the metal part into the sample that you want to measure. Just as with a liquid-in-glass thermometer, DO NOT let the metal part touch the base and sides of the container. Keep the thermometer suspended by holding it up. d) Wait for the numbers on the LCD screen to stop switching. The numbers you end up with is the temperature of the sample. e) Wash the metal part with deionized/distilled water and dry it before using it again or putting it away. 3. Lesson Activity: Measure and Compare! <i>General Instructions for learners:</i> 1. The class will be divided into four groups. Each group will be given a simple science equipment to use to measure the mass and temperature of five things.	Provide a digital thermometer (if possible and available). Demonstrate first, step by step, and then call 1-2 volunteers to manipulate the thermometer. Make sure to prepare the samples before the class starts. The samples must be ready to serve when the time for the activity comes.
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2. Groups 1 and 2 will be given a triple beam balance and an analytical balance respectively and are assigned to measure the mass of five samples.

For Groups 1 and 2:

SAMPLE	MASS (in grams)
1. A stick of chalk	
2. A piece of candy	
3. A spoonful of brown sugar	
4. A bag of tea	
5. A stick of instant coffee	

3. Groups 3 and 4 will be given a liquid-in-glass thermometer and a digital thermometer respectively and are assigned to measure the temperature of five samples.

For Groups 3 and 4:

SAMPLE	TEMPERATURE (in centigrade)
1. A glass of water	
2. A glass of fresh milk	
3. A glass of cola	
4. A glass of orange juice	
5. A glass of iced tea	

4. Afterwards, the groups will then present their answers to the class. Groups 1 and 2 will compare their measurements, while Groups 3 and 4 will compare theirs. The group's output and presentation will be graded.

Week 8 – Day 3

Lesson 2: Planning Simple Scientific Investigations Using Appropriate Simple Science Equipment

1. Explicitation

Tell the students to work neatly and quietly. The discussion of their answer can be done the following day if there is a time constraint.

Discuss the importance of precision and the difference in terms of precision when you use mechanical vs digital measuring instruments.

Proceed and facilitate an interactive discussion by answering the processing questions. Sample answers are given for your reference. Prepare a visual aid/ slide deck for this part.

Say, "Now that you know how to use simple science equipment, it is time for you to learn how to determine which equipment is best used for measuring something, whether it be mass or temperature."

Processing Question:

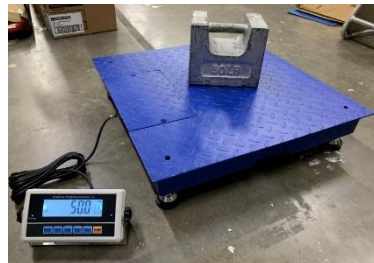
1. What instrument/equipment is used to measure mass?

- When it comes to measuring mass, a balance must be used. Do recall that there are many types of balances, and we must take into consideration the objects we want to get the mass of. The most well-known laboratory balances are triple beam balances and analytical balances, which are used to measure samples with small masses. If we want to get the mass of a person, we cannot use a triple beam balance nor an analytical balance, as both tools are too small for such a purpose. In this case, a bathroom scale would be more appropriate.



A person using a mechanical bathroom scale.

For measuring the mass of large and heavy objects, such as packages, sacks of rice and the like, a *floor scale* is used. Floor scales are built in such a way that said objects can be loaded on its platform with minimal lifting.



A floor scale measuring the mass of a 50-pound (lb) block. 50 lb is equal to 22.7 kg.

2. What instrument/equipment is used to measure temperature?

- When it comes to measuring temperature, thermometers are the tool of choice. Just like with choosing the right balance depending on our intended

purpose, the same can be said for thermometers. If we want to measure the temperature of a person to determine whether they are sick or not, we cannot use laboratory-grade liquid-in-glass and digital thermometers, as they are too large for bodily use. Laboratory liquid-in-glass thermometers also do not have **kinks**, which are structures inside the glass that would prevent the liquid from falling back down so that the temperature reading will stay for a while.



A clinical thermometer with a kink. The kink, encircled in red, prevents the liquid from falling back down.

Instead, clinical thermometers are used, which are much smaller in scale and are appropriate for use with humans and animals. These medical thermometers may be in the form of liquid-in-glass or digital thermometers. The clinical liquid-in-glass thermometers have kinks in the structure that would allow us to look at a temperature reading for longer.

In the same way, clinical thermometers cannot be used to measure the temperature of very hot objects, such as that of boiling water. Both clinical liquid-in-glass and digital thermometers only give readings within a range of 35 °C to 42 °C. Clinical thermometers are intended for measuring the temperature of the human body, which falls within this range.

2. Worked Example

- Refer to LAS2 Science 5 Week 8 Worksheet.

Say, “Using the skills that you just learned through this lesson, we will now try to prove that gases and liquids are matter.”

Matter is anything that occupies space and has mass. For as long as something has mass, it is occupying space as well, since **mass describes the amount of matter** in a substance. Through this, we can prove that if a substance has mass, it is therefore occupying space, and is also therefore matter.

Allow learners to answer LAS2.

Answers:

1. B
2. E
3. A
4. C
5. D

After answering LAS2, seamlessly connect it to the questions and concepts tackled in this part of the lesson. This is a springboard to the lesson activity to be done later.

	The three basic states of matter—solid, liquids, and gases—are regarded as such since they all have mass. We know for sure that solids and liquids have mass, since we hold and see them daily: but what about gases? Can we really say that they have mass if they feel weightless? One way to determine this is to measure the mass of gases within a container using an analytical balance. To reliably contain gas inside a container, what kind of container should we use? A balloon would be a good container to contain gas, as a balloon would inflate as we pour more gas into it. We measure the mass of liquids the same way, by first containing the liquid in a container before placing it on an analytical balance. For us to get the mass of the liquid and the gas itself, we must tare our balance with the mass of the container. With this, it is best to tare the container we are going to use first before we pour our liquid or pump our gas into the container. Once you have measured and recorded that a gas does indeed have mass, we can now confirm that gases are matter. Week 8 – Day 4 3. Lesson Activity: Experiment – Do Gases and Liquids Have Mass? Refer to LAS3 Science 5 Week 8 Worksheet <i>General Instructions for learners:</i> The class will be divided into four groups. Each group will be given a chance to use an analytical balance, as well as a small (4 inch) latex balloon, a balloon pump, and a 100 mL beaker. Each group is instructed to tare the containers first before pouring the substance (water for the cup, air for the balloons) and measuring their masses.	For this springboard discussion, you can prepare a visual aid/ slide deck. Prepare the needed materials for this activity beforehand. Let the learners do the activity and answer the guide questions. Facilitate an interactive discussion using the guide questions after the experiment.
D. Making Generalizations	1. Learners' Takeaways: Exit Ticket As a review activity, please prepare an exit ticket summarizing one concept you've learned from our class discussion and experiment. One exit ticket is equivalent to a merit point in class. Choose one question to answer: - What type of equipment do we use to measure mass? - What type of equipment do we use to measure temperature?	<i>Learners' Takeaways</i> You may provide any incentive or reward to those who will give their entrance ticket. Make sure to reiterate important concepts

	3. Would you use an analytical balance to measure your bodyweight? Why or why not? What kind of balance should you use? 4. Would you use a laboratory liquid-in-glass thermometer to measure your body temperature? Why or why not? What kind of thermometer should you use? 2. Reflection on Learning Reflect on the following questions as we relate measuring temperature with global warming. - What is global warming and climate change? - How can climate change affect us negatively? - The comfortable room temperature range for humans is 20 to 25 °C. How would you feel if the temperature was below 20 °C? How about if it is above 25 °C? - Show the learners a recording of the room temperature that they are in. Is the temperature comfortable for them? - How can we reduce global warming?	indicated in the entrance tickets of selected learners. Have the learners relate what they have learned in the lesson and apply it in an environmental context. Relate how we humans must live in a comfortable temperature to survive, and that climate change can make a location too hot or too cold to live.
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IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	1. Formative Assessment I. Multiple Choice Questions: Read each item and its options carefully. Encircle the letter of the best answer. - Which balance has three movable weights that you can slide around to determine the mass of a sample? - analytical balance - top-loading balance - triple-beam balance - mechanical balance - Which equipment is used to measure the mass of large and heavy objects, such as packages and sacks of rice?	<i>Formative Assessment Answer Key</i> I. Multiple Choice - C - B - C - B - C - B - A - B - B

- A. fish scale
- B. floor scale
- C. physician scale
- D. bathroom scale

3. Which tool would you use to measure the body temperature of a person?

- A. food thermometer
- B. digital thermometer
- C. clinical thermometer
- D. laboratory thermometer

4. In liquid-in-glass thermometers, what happens to the liquid inside as its bulb is placed on a cold sample?

- A. the liquid freezes
- B. the liquid shrinks
- C. the liquid expands
- D. the liquid blows up

5. Suppose you are tasked to measure the mass of five rice grains. Which scale or balance would you use to get its mass?

- A. floor scale
- B. bathroom scale
- C. analytical balance
- D. top-loading balance

6. Why are clinical thermometers not suited for measuring the temperature of boiling water?

- A. The temperature readings exceed 100 °C.
- B. The temperature readings are only up to 42 °C.
- C. The temperature readings can only go for as low as 35 °C.
- D. The temperature readings can go for as low as below 0 °C.

10. C

II. Illustration

Any drawing style is acceptable, for as long as it looks similar to the following pictures:



1.



2.

	7. Which between the two types of thermometers are faster at measuring temperature? - digital thermometers - liquid-in-glass thermometers - both take time to measure temperature - both are quick at measuring temperature 8. What structure in clinical thermometers prevents the liquid inside it from falling below a certain point? - bulb - kink - probe - degree 9. A physician scale is used to measure the mass of a person or animal. What unit of measurement would a physician scale have? - grams - kilograms - milligrams - micrograms 10. When using a liquid-in-glass thermometer, why is there a need to tap it lightly first? - to check for cracks in the thermometer - to wake up the liquid so that it is more alert - to let the liquid fall to the bottom of the thermometer - all of the above II. Illustration. Draw what is asked in each item. - An analytical balance. - A liquid-in-glass thermometer. 2. Homework (optional)	
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B. Teacher's Remarks	<i>Note observations on any of the following areas:</i>	Effective Practices	Problems Encountered	
	strategies explored			
	materials used			
	learner engagement/ interaction			
	Others			
C. Teacher's Reflection	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?			

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