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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Science

Quarter 4
Lesson
4

Lesson Exemplar for Science Grade 7
Quarter 4: Lesson 4 (Week 4)
SY 2024-2025

Development Team

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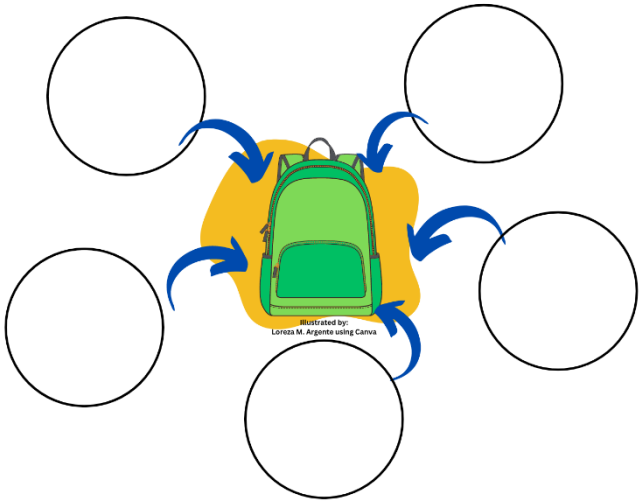
SCIENCE (EARTH AND SPACE SCIENCE) /QUARTER 4/ GRADE 7

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners learn that the damage or effects on communities depend on the magnitude of and distance from an earthquake.
B. Performance Standards	By the end of the Quarter, learners will appreciate the value of using systems to analyze and explain natural phenomena and demonstrate their understanding of the dynamics of faults and earthquakes. They are confident in identifying and assessing the earthquake risk for their local communities using authentic and reliable secondary data. They use the country's disaster awareness and risk reduction management plans to identify and explain to others what to do in the event of an earthquake. Learners explain the cause and effects of secondary impacts that some coastal communities may experience should a tsunami be produced by either local or distant earthquake activity. Learners use reliable scientific information to identify and explain how solar energy influences the atmosphere and weather systems of the Earth and use such information to appreciate and explain the dominant processes that influence the climate of the Philippines.
C. Learning Competencies and Objectives	***Learning Competencies: Refer to the local disaster readiness plans to demonstrate what to do during and after an earthquake*** **Learning Objectives:** 1. Identify the key components of the local disaster readiness plan related to earthquakes; 2. Demonstrate the correct technique for "Drop, Cover, and Hold On" during simulated earthquake drills.; and 3. Increased confidence in their ability to respond effectively during and after an earthquake by following the local disaster readiness plan. ***Learning Competencies: Describe procedures that the authorities have in place to alert communities of pending tsunamis and what procedures can be implemented should a tsunami impact a community;*** **Learning Objectives:** 1. Describe the communication channels through which authorities disseminate tsunami warnings; 2. Demonstrate the ability to follow evacuation procedures in response to a tsunami warning; and 3. Appreciate the importance of preparedness for tsunamis.
C. Content	Topic: Earthquake and Tsunami Preparedness Sub Topics: **1.** Intensity Scales **2.** Preparedness (different locations and contextualized local disaster plans)

D. Integration	Safety and Resiliency; Impacts on society as well as the economic growth/ Society and Economic Impacts

II. LEARNING RESOURCES
• The San Andreas Fault - VIII. “Magnitude” and “Intensity.” (n.d.). https://pubs.usgs.gov/gip/earthq3/magnitude.html • Oxford Languages Dictionary • simulate. (2024). https://dictionary.cambridge.org/dictionary/english/simulate • The Modified Mercalli Intensity Scale | U.S. Geological Survey. (n.d.). https://www.usgs.gov/programs/earthquake-hazards/modified-mercalli-intensity-scale

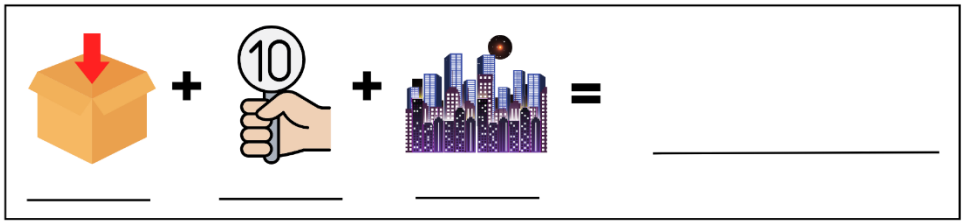
III. TEACHING AND LEARNING PROCEDURE		**NOTES TO TEACHERS**
A. Activating Prior Knowledge	• **Short Review (Day 1)** The teacher facilitates the activity, “Pass the cabbage” • The teacher activity requires some upbeat music to be played. When the music starts, the cabbage will be passed on from one student to another, when the music stops, the student holding the cabbage will peel one layer of it to reveal the question. ***Descriptions:*** • It refers to a series of ocean waves that sends surges of water, sometimes reaching heights of over 100 feet (30.5 meters), onto land. • The motion of this type of wave has particles that forms a horizontal line that is perpendicular to the propagation direction. The energy of Love waves radiates in two directions rather than three. • This type of waves are compressional waves that travel through solids, liquids, and gases. They propagate through a substance by compressing and expanding it alternately.	• Target time frames may change depending on the ability of the learners and the flow of discussion. The teacher needs to prepare the cabbage before the class starts. It doesn’t require a true cabbage to use, it could be layers of papers joined together just like a cabbage. **Answers:** Tsunami Love wave P-waves Rayleigh wave S-waves

	• The motion of this type of wave is a mix of longitudinal, compressional, and dilatation. As a result, the particles travel elliptically in the vertical plane. • They are also known as shear waves, and they can only propagate in hard, solid materials by vibrating particles in a direction perpendicular to the propagation.	
B. Establishing Lesson Purpose	• **Lesson Purpose** The teacher will tell the learners that he/she has a go backpack, and ask them the questions below: 1. If there is a disaster, what are the essential things that you will pack in your bag? 2. When should you prepare your things in an emergency bag? 3. What is the importance of getting ready in a disaster?  	The teacher may prepare a visual aid in presenting the go back pack and add more circles to represent the items that the learners may bring. Give emphasis on the preparation of the go backpack before the disaster happens and limit its content to the most essential things. Lead the class by naming the individual pictures to form a

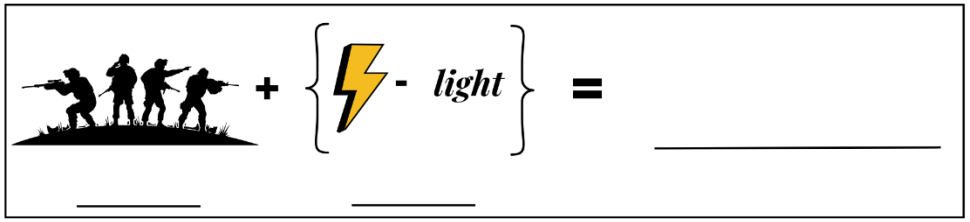
- **Unlocking Content Vocabulary**
  Learners will answer the Picto-word activity to reveal the mstery word.

1.

Picto-word illustrated by Loreza M. Argente using Canva



2.



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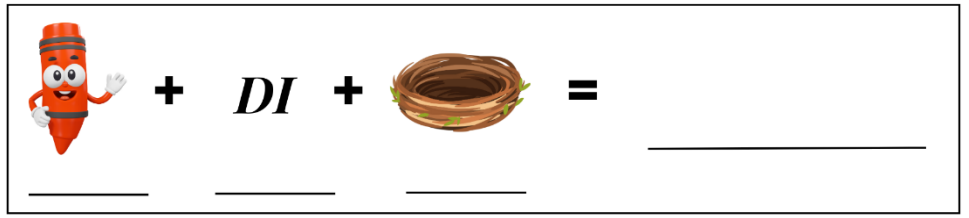

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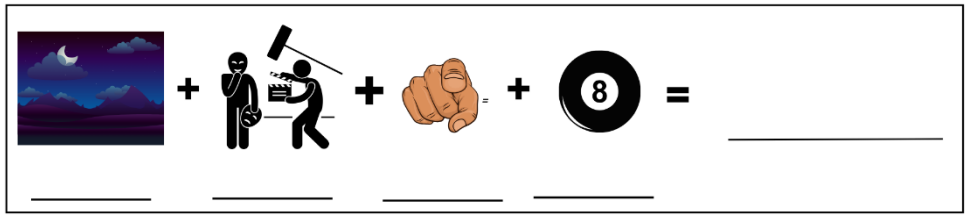


word that relates to the new topic.

Answers:

1. IN + TEN + CITY = INTENSITY
2. WAR + ~~LIGHT~~NING = WARNING
3. RED + DI + NEST = READINESS
4. EVE + ACT + YOU + 8 = EVACUATE
5. SIM + YOU + LATE = SIMULATE

Lead the learners to the goal of the lesson by connecting the words that they have revealed.

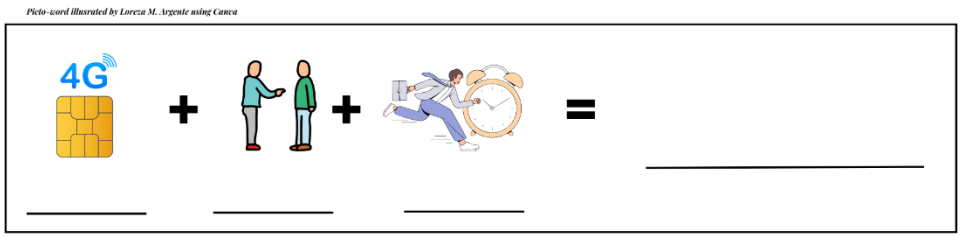
	5.  **Definition of terms.** 1. INTENSITY - is a measure of the strength of shaking experienced in an earthquake. 2. WARNING - a statement or event that indicates a possible or impending danger, problem, or other unpleasant situation 3. READINESS - the state of being fully prepared for something: 4. EVACUATE - remove (someone) from a place of danger to a safer place 5. SIMULATE - to produce a situation or event that seems real but is not real, especially in order to help people learn how to deal with such situations or events.	• Intensity scales, like the Modified Mercalli Scale and the Rossi-Forel scale, measure the amount of shaking at a particular location.
C. Developing and Deepening Understanding	**(Day 2)** **SUB-TOPIC 1: Intensity Scales** **1. Explicitation** Compare the damage caused by an earthquake. What can you say about the 2 pictures?	Let the learners realize that not all earthquake bring the same damage. Ask them to recall the most recent earthquake that they felt.

Image retrieved at *https://www.geoengineer.org/storage/news/2535/featured_image/8853/featured_image.jpeg*

Image retrieved at: *https://media.istockphoto.com/photos/cracked-wall-picture-id524885417?k=6&m=524885417&s=612x612&w=0&h=aQEbchIg-LN0JO8mroQQJV19eO4OovSp9NPvJZl1Ksg=*

Question: What is the importance of using intensity scales?

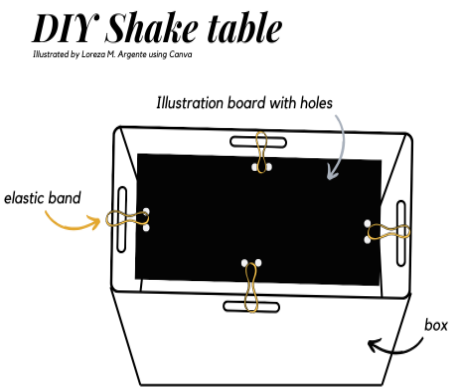
2. Worked Example

I. Activity No. 4.1: Shake and Rate (30 mins)

II. Objective(s): At the end of the activity, you should be able to understand how intensity scales measure earthquake effects by simulating and rating the intensity of shaking using a shake table.

III. Materials Needed: DIY shake table, Objects of varying sizes and weights (e.g., toy buildings, LEGO structures, small containers filled with sand or rice), intensity scale cards (printed copies of the Modified Mercalli Scale), stopwatch or timer

IV. Instructions:



1. Select an object and place it on the shake table.
2. Start the shake table to simulate an earthquake, gradually increasing the intensity of shaking.
3. As the shake table operates, you should observe the behavior of the object and discuss its movement and stability.
4. After each trial, you should rate the intensity of shaking based on the observed effects using the intensity scale cards.
5. Encourage students to record their observations and intensity ratings in their notepads.

Guide Questions:

1. What factor/s may influence the intensity of shaking experienced by different objects?
2. How can intensity scales assist in measuring earthquake effects?
3. How can the intensity scales assist in earthquake preparedness and safety?

Rubric or Score Guide

Advanced (20 points)	Proficient (18)	Nearly Proficient (16)	Emerging (14)	Needs Improvement (12)
All of the required fields were answered, and the answers to guide questions were well-organized	All of the required fields were answered, and the answers were well-organized and completely	Some of the required fields were answered, and the answers were somewhat organized and	Some of the required fields were answered, but the answers were not organized and	Few of the required fields were answered, and the answers were not organized and

Intensity scales play a crucial role in assessing earthquake effects, comparing earthquakes, assessing risk, raising public awareness, facilitating communication, and advancing scientific research. Their use is essential for effective earthquake preparedness, response, and mitigation efforts.

The first intensity scale of modern times was developed by De Rossi of Italy and Forel of Switzerland in 1880s. This scale, which is still sometimes used in describing damage effect of an earthquake, has values I to X. The 1906 San Francisco earthquake was rated with the Rossi-Forel intensity scale. For description of this scale readers are referred to Richter (1958).

and completely explained in detail.	explained, but not in detail.	explained but not in detail.	not explained in detail.	not explained in detail.

If toy buildings are not available, the learners may create infrastructures using straw, clay, or paper.

IV. Extended Activity

Research real-life earthquakes and use intensity scales to assess the effects on buildings and communities, then present your findings to the class. You may refer to https://earthquake.phivolcs.dost.gov.ph/ for the data.

3. Lesson Activity

Arrange the following description/damage of the Modified Mercalli Intensity scale based on its intensity from the weakest to the strongest.

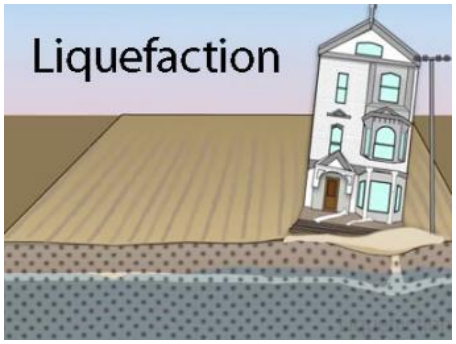
Compare and contrast the intensity ratings given by different groups for similar objects.

Factors may include but not limited to the object's size, weight, and construction.

Intensity scales play a critical role in measuring earthquake effects, assessing seismic hazard and risk, and enhancing earthquake preparedness and safety.

By providing valuable information about the impact of earthquakes on communities and infrastructure, intensity scales help authorities and individuals make informed decisions and take proactive

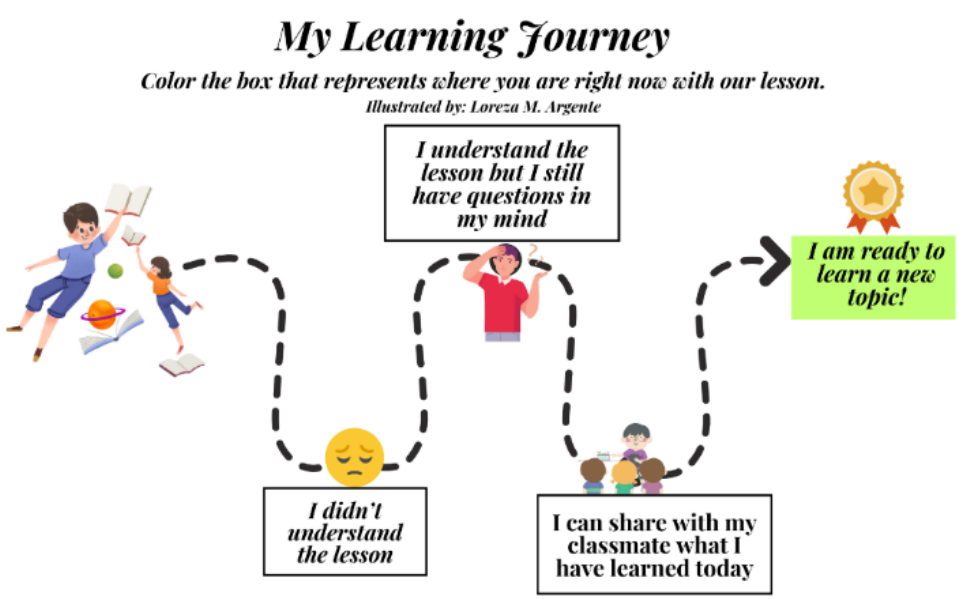
	Not felt except by a very few under especially favorable conditions. Felt only by a few persons at rest,especially on upper floors of buildings. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. **Day 3** **SUB-TOPIC 2: 2.Preparedness (different locations and contextualized local disaster plans)** 1. **Explicitation** Learners will determine if the photo shows a hazard of earthquake or not.	measures to mitigate earthquake risk and enhance resilience. You may refer to the sample earthquake data below. Allow the learners to identify the damage and or what the mentioned places experience with the intensity that they felt. https://earthquake.phivolcs.dost.gov.ph/ The teacher will prepare cut-outs of the description of the Modified Mercalli Intensity scale and let learners try to arrange them from the weakest to the strongest intensity. The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects experienced at that place. The lower numbers of the intensity scale generally deal with how the earthquake is felt by people. The higher numbers on the scale are based on observed structural damage. Structural engineers usually

	1.  *Image retrieved at: https://clipground.com/images/clipart-lng-earthquake-9.png lifted on 03/01/2024* 2.  *Image retrieved at: https://th.bing.com/th/id/R.cf7bd123e46664ae0cb71c498148e3da?rik=THVuk%2bw%2fbOV0TA&riu=http%3a%2f%2fwww.iris.edu%2fhq%2finclass%2fuploads%2fA_4D_sf_liquefaction1906_thumbnail.jpg&ehk=COkngA4rgdTuQ6HoY2HSGz%2b5oNcWjZ0AE8bzeJINgmU%3d&risl=&pid=ImgRaw&r=0 lifted on 03/01/2024* 3.  *Image retrieved at https://media.istockphoto.com/vectors/drop-cover-hold-sign-earthquake-vector-icon-vector-id1191675348?k=6&m=1191675348&s=170667a&w=0&h=LiNr2HTucV_g8RDIHZyFazfak1i0Ik0QLVcE3CHkJ8Y= lifted on 03/01/2024*	contribute information for assigning intensity values of VIII or above. Answer: 1. Yes. Ground rupture 2. Yes. Liquefaction 3. No. This protects you from any objects that may hurt you.

	2. Worked Examples **I. Activity No. 4.2.1:** Disaster Readiness Plan Simulation – Earthquake Response (30 mins) **II. Objective(s):** At the end of the activity, you should be able to demonstrate their understanding of local disaster readiness plans by simulating appropriate actions to take during and after an earthquake. **III. Materials Needed:** Local disaster readiness plans or guidelines provided by relevant authorities, Visual aids (posters, diagrams, or presentations) illustrating earthquake safety procedures, stopwatch or timer, safety equipment (if applicable, such as helmets or goggles for demonstration purposes) **IV. Instructions**: 1. Simulate the actions you would take before earthquake based on the scenario provided, following the procedures outlined in the readiness plans. 2. Demonstrate appropriate responses during shaking, such as taking cover under sturdy furniture, staying away from windows and heavy objects, and holding on until the shaking stops. 3. After the simulated earthquake, demonstrate post-earthquake actions, such as checking for injuries, assessing damage, and evacuating to safe assembly areas if necessary. **Rubric in Rating the Performance:** Proper Simulation (before during, and after): 10 points Creativity and impact: 5 points Time-bound: 5 points **Total: 20 points** **V. Extension.** Share what you have learned with your families and friends, promoting a culture of preparedness within your community.	The teacher may divide the class into 2 so that there will be groups to participate in the role paly, and groups to evaluate the performance. Use a stopwatch or timer to ensure that each group has sufficient time to simulate their scenario and discuss their actions. Begin by discussing with the students the importance of being prepared for earthquakes and the role of disaster readiness plans in ensuring safety. Introduce the local disaster readiness plans or guidelines provided by relevant authorities, highlighting key procedures for earthquake response.

	3. Lesson Activity **I. Activity No. 4.2.2:** Tsunami Alert and Response Simulation **II. Objective(s):** At the end of the activity, you should be able to describe procedures that authorities have in place to alert communities of pending tsunamis and propose procedures to implement should a tsunami impact a community. **III. Materials Needed:** Large open area or gymnasium, cones or markers to designate different zones, whistles or bells, printed cards with roles and scenarios, timer or stopwatch, whiteboard and markers **IV. Instructions**: 1. Each member of the group will be assigned to a specific role which may include local authorities, emergency responders, community members, and media representatives. Scenarios may involve different levels of tsunami threat and impact on the community. 2. A tsunami alert has been issued, and you must act out your assigned roles based on the given scenario. 3. Start the simulation by sounding a whistle or bell to signal the beginning of the alert phase. 4. Students in the roles of local authorities initiate alert procedures, such as activating sirens, broadcasting warnings through loudspeakers, and sending out text messages and social media alerts. 5. Students representing emergency responders should mobilize resources, coordinate evacuation efforts, and provide assistance to vulnerable populations. 6. Community members should follow evacuation procedures, gather at designated assembly points, and support each other during the evacuation process. 7. Make sure to communicate and collaborate as you navigate through the simulation.	Begin by recalling with students what tsunamis are and why they are dangerous natural disasters. Explain the importance of having alert systems and procedures in place to warn communities about impending tsunamis and to respond effectively in case of an impact. In case the large open area is not available, the teacher may maximize the space inside the classroom. Learners who performed in the previous activity may now be the evaluators and switch with the other group to perform the activity.

	Rubric in Rating the Performance: Proper Simulation (before during, and after): 10 points Creativity and impact: 5 points Time-bound: 5 points **Total: 20 points** **V. Extension.** Research historical tsunamis and analyze the effectiveness of alert systems and response efforts in mitigating the impact on affected communities.	Distribute printed cards to each group, assigning them roles and scenarios related to tsunami alert and response. Designate different zones within the playing area to represent the coastline, residential areas, evacuation routes, etc.
D. Making Generalizations	• **Learners' Takeaways (Day 4)** Craft a brochure to promote the importance of preparedness before, during, and after a disaster. The learners are free to choose, which disaster they wanted to work on. • **Reflection on Learning**	The brochure can be hand written or printed The teacher may reproduce the learning journey map. If reproduction is not possible, the learners may just write the statement that corresponds to their answer.



Question/s I wanted to ask:

_____
_____
_____

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	**1. Formative Assessment** 1. Which of the following statements best describes the purpose of intensity scales in assessing earthquake effects? A) Intensity scales measure the depth of an earthquake's epicenter. B) Intensity scales quantify the energy released by an earthquake. C) Intensity scales evaluate the effects of an earthquake on people, structures, and the environment.	**Answers:** 1. C) Intensity scales evaluate the effects of an earthquake on people, structures, and the environment.

	D) Intensity scales determine the duration of shaking during an earthquake. 2. How does the Modified Mercalli Scale differ from the Richter Scale? A) The Modified Mercalli Scale measures earthquake magnitude, while the Richter Scale measures earthquake intensity. B) The Modified Mercalli Scale measures earthquake depth, while the Richter Scale measures earthquake duration. C) The Modified Mercalli Scale measures earthquake effects, while the Richter Scale measures ground shaking. D) The Modified Mercalli Scale measures earthquake frequency, while the Richter Scale measures earthquake location. 3. During an earthquake, what is the most appropriate action to take if you are indoors? A) Stay inside and hide under a sturdy piece of furniture. B) Run outside and seek open space immediately. C) Stand in a doorway to prevent door collapse. D) Turn off all utilities and evacuate the building. 4. Which of the following items should be included in an earthquake preparedness kit? A) Matches and candles for lighting. B) A battery-operated radio and extra batteries. C) Bottled water and non-perishable food items. D) All of the above. 5. What is the primary goal of tsunami evacuation procedures? A) To gather belongings and secure valuables. B) To seek high ground or move inland to avoid tsunami waves. C) To stay inside buildings and wait for rescue. D) To drive to the coast and observe the tsunami.			2. C) The Modified Mercalli Scale measures earthquake effects, while the Richter Scale measures ground shaking. 3. A) Stay inside and hide under a sturdy piece of furniture. 4. D) All of the above. 5. B) To seek high ground or move inland to avoid tsunami waves.
1. Teacher's Remarks	*Note observations on any of the following areas:*	**Effective Practices**	**Problems Encountered**	

	strategies explored			
	materials used			
	learner engagement/ interaction			
	others			
2. 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?*			