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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Science

Quarter 4
Lesson
1

Lesson Exemplar for Science Grade 7
Quarter 4: Lesson 1 (Week 1)
SY 2024-2025

Development Team

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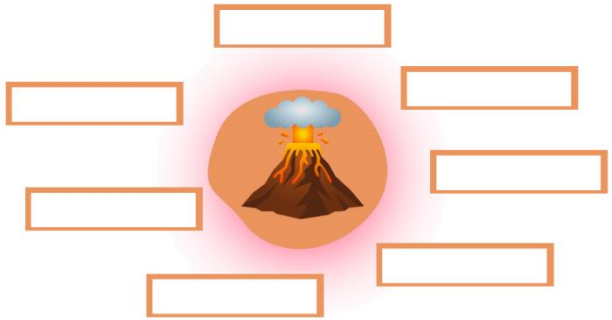
SCIENCE (EARTH AND SPACE SCIENCES) /QUARTER 4/ GRADE 7

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners learn that rapid movements along normal, reverse or strike-slip faults cause earthquakes.
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 Competency:*** *Classify geological faults according to the angle of the fault plane and direction of slip;* ***Learning Objectives:*** **1.** *Describe the Pacific Ring of Fire;* **2.** *Classify the geologic faults according to the angle of the fault plane and the direction of slip; and* **3.** *Acknowledge the relevance of seismic activities with the location of the country.* ***Learning Competency:*** *use models or illustrations to explain how movements along faults generate earthquakes and identify and explain which types of faults are most likely to occur in the Philippines and explain why* ***Learning Objectives:*** **1.** *Illustrate how movement along faults generates earthquakes;* **2.** *Analyze a map that shows the faults and fault lines in the Philippines; and* **3.** *Recognize locations that are safe during earthquakes in the Philippines.*
• **Content**	Topic: Introduction to Earthquakes and Faults Sub Topics: **1.** Energy within the Earth and the Pacific Ring of Fire: Introduction to earthquake **2.** Faults 2.1Types of Faults

	2.2 Active and Inactive Faults 2.3 Fault Lines in the Philippines
• **Integration**	Safety and Resiliency

II. LEARNING RESOURCES
• Samonte, B. S. et.al. First edition (2019). *Science 8 Quarter 2 – Module 1: Earthquakes and Faults,* Department of Education Caraga https://www.britannica.com/science/seismicity, accessed: 02/24/2024 • Yanukovich, Y. (2024, January 30). Top countries where earthquakes most often occur. Realting.com. https://realting.com/news/which-countries-are-most-prone-to-earthquakes lifted: 02/24/2024

III. TEACHING AND LEARNING PROCEDURE		**NOTES TO TEACHERS**
A. Activating Prior Knowledge	**Day 1** • **Short Review** The teacher will show a picture of a volcano and post it on the board. Write as many words as they can recall that are associated with the volcano.  *Illustrated by: Loreza M. Argente using Canva*	• Target time frames may change depending on the ability of the learners, the flow of discussion, and the availability of the materials. • This priming activity is meant to recall the lesson that the learners had about volcanoes when they were in grade 6. • If printing of the picture is not possible, you may ask a learner to draw a volcano based on how they recall it, or just write the word volcano at the center.

B. Establishing Lesson Purpose

- **Lesson Purpose**

Show the learners a news film on the Philippine fault zone and ask them these questions:

Processing Questions:

1. What is the video about?
2. Why is it important for you to learn about the Philippine Fault Zone and its implications?

If television is not available, the teacher may print a copy of the Philippine Fault Zone and discuss its implications.

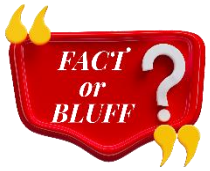
Video link: https://youtu.be/IVXn92K_bMA

- **Unlocking Content Vocabulary**

Unscramble the letters of the term being described by the given statement.

SCRAMBLED LETTERS	DESCRIPTION
FLUAT	It is a fracture in the Earth's crust through which movement has occurred
E T R A H A U E K Q	It is a sudden and violent shaking of the ground caused by the movement of the tectonic plates beneath the earth. It can occur on land or under the ocean.
H A I G N N G W L L A	The side of a non-vertical fault that occurs above the fault plane.
F T O O L A L W	The side of a non-vertical fault that can be found below the fault plane.
S E I I C M S A I I C T T V Y	Also referred to as seismicity, is the occurrence and distribution of earthquakes in a region.

The teacher can make this activity more engaging by grouping the class cutting out the letters and allowing them to manipulate and post the correct word to the board.

C. Developing and Deepening Understanding	**Day 2** **SUB-TOPIC 1:** Energy within the Earth and the Pacific Ring of Fire - Introduction to Earthquake **1. Explicitation** The teacher facilitates a true or false activity based on what they have previously learned.  ***Is it a Fact or a Bluff?*** Ask the learners if the statement is a fact or a bluff. If their answer is a bluff, ask them why it is a bluff. 1) The Pacific Ring of Fire covers a chain of shoreline countries around the Atlantic Ocean. 2) The Pacific Ring of Fire is where wildfire often occurs. 3) The movement of the ground is responsible for the geological activities on the Pacific Ring of Fire. **2. Worked Example** The teacher will show the picture to the class and ask them the questions that follow. 	The teacher may modify the activity by assigning/adding a hand gesture in answering the statement. Ask the learners for the reason for their answers each time they answer false. Answers: 1) Bluff. It dominates the Pacific Ocean 2) Bluff. It is a region where a large number of earthquakes and volcanic eruptions occur regularly due to the movement and interaction of tectonic plates along the Pacific Ocean basin. 3) Fact *Image retrieved at https://static.dw.com/image/60460700_7.png, lifted: 02/24/2024*

	● What do you see in the picture? ● Why is it called the Pacific Ring of Fire? ● Why are there a lot of volcanoes in the Pacific Ring of Fire? ● Aside from volcanic eruptions, do you know other phenomena in the Pacific Ring of Fire?	● Learners may have varied answers, including but not limited to the volcanoes, plates, and plate boundaries. ● The Pacific Ring of Fire dominates the Pacific Ocean with at least 450 dormant and active volcanoes, forming a horseshoe. ● There are a lot of volcanoes in the Pacific Ring of Fire because of the movement, collision, and destruction of lithospheric plates. ● Aside from volcanic eruption, earthquakes also occur in the Pacific Ring of Fire.

1. Lesson Activity

I. Activity No. 1: Map Me! (20 mins)

II. Objective(s): At the end of the activity, the students should be able to map the listed places, analyze its location and relate it to its seismic activity.

III. Materials Needed: world map/globe, marker

IV. Instructions:

1. Locate the following countries on the map/globe with a marker.

o Japan	o Turkey
o Indonesia	o Peru
o China	o U.S.
o Philippines	o Italy
o Iran	o New Zealand

2. Analyze the location of the marked countries, then, answer the guide questions that follow.

Guide Questions:

1. What do you notice about the location of the places listed above?
2. How is the location of the places related to its seismic activity?

Rubric or Score Guide

Advanced (5 points)	Proficient (4)	Nearly Proficient (3)	Emerging (2)	Needs Improvement (1)
All of the listed places were located, and the answers were well-organized and completely explained in detail.	All of the listed places were located, and the answers were well-organized and completely explained, but not in detail.	8-9 of the listed places were located, and the answers were somewhat organized and explained but not in detail.	6-7 of the listed places were located, but the answers were not organized and not explained in detail.	Below 6 places were located, and the answers were not organized and not explained in detail.

The answer of learners must be directed to the following idea: The countries listed belong to the Pacific Ring of Fire. The term "Ring of Fire" specifically refers to the chain of volcanoes that encircle the Pacific Ocean, indicating the high level of volcanic and seismic activity in the region.

Day 3

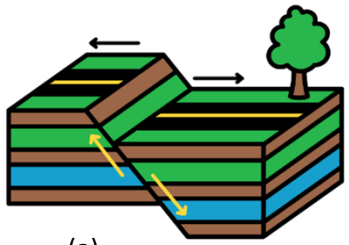
SUB-TOPIC 2: Faults

2.1 Types of Faults
2.2 Active and Inactive Faults
2.3 Fault Lines in the Philippines

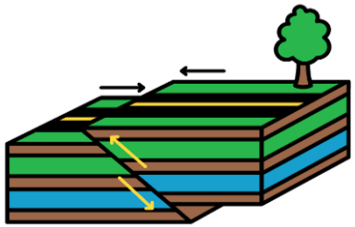
1. **Explicitation**

Match the Faults

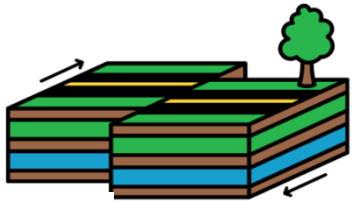
Direction. Identify the fault being described by the statements by placing them near the picture.



(a)



(b



(c)

Angle: Inclined at an angle greater than 45 degrees from the horizontal

Angle: Inclined at an angle less than 45 degrees from the horizontal

Angle: Nearly vertical with minimal inclination from the horizontal

Direction of Slip: Horizontal motion, where two tectonic plates slide past each other horizontally

Direction of Slip: Vertical motion, where hanging wall moves downward relative to the footwall that occurs from tensional tectonic settings.

Direction of Slip: Vertical motion, where hanging wall moves upward relative to the footwall that typically form in compressional tectonic settings.

Illustration adapted from Niña Santos from Sketchify Education, colors edited by Loreza M. Argente using Canva

The learners will analyze the pictures and match them with the corresponding descriptions to be posted by the teacher.

This activity will check what the learners know and what they can do by analyzing figures. Make sure to relate the previously learned earthquakes to the movement of the plates. Identify the hanging wall and the foot wall in each figure.

2. Worked Example

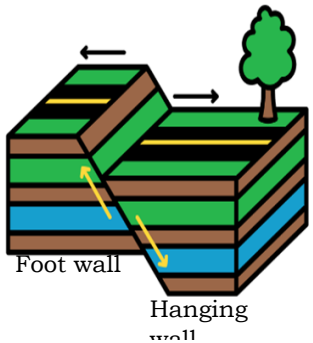
Gallery walk: Ask the students to do the activity: A walk to the different faults. The teacher will prepare 4 stations containing information on the different types of plates. Give the students a copy of the worksheet, and have them fill out the table as they go around the stations.

(use the student worksheet provided)

The stations can be set up ahead of time in a laboratory. If a laboratory or an extra room is

STATION 1

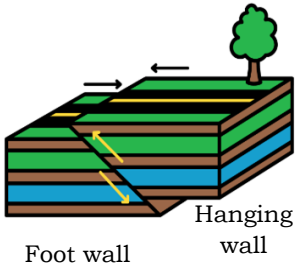
Type of fault: Normal fault
Fault Plane Angle: Inclined at an angle less than 45 degrees from the horizontal.
Direction of Slip: Vertical motion where the hanging wall moves downward relative to the footwall. This type of faulting occurs in extensional tectonic settings, such as divergent plate boundaries.



Generation of Seismic Activity: Forms in areas undergoing extensional tectonic stress, where the Earth's crust is being pulled apart (divergent movement) forming valleys. As the hanging wall moves downward relative to the footwall, tensional stress builds up along the fault plane. Eventually, the accumulated stress exceeds the strength of the rocks, causing them to rupture and release energy in the form of seismic waves.

STATION 2

Type of fault: Reverse Faults (Thrust Faults)
Fault Plane Angle: Inclined at an angle greater than 45 degrees from the horizontal.
Direction of Slip: Vertical motion where the hanging wall moves upward relative to the footwall. Reverse faults typically form in compressional tectonic settings, such as convergent plate boundaries.



Generation of Seismic Activity: Reverse faults form in areas undergoing compressional tectonic stress, where the Earth's crust is being pushed together. As the hanging wall moves upward relative to the footwall, compressional stress builds up along the fault plane. When the accumulated stress exceeds the strength of the rocks, they break along the fault, releasing stored energy as seismic waves.

not available, this can also be done inside the classroom.
If the number of students makes it impossible to set-up 3 stations and doing so will create chaotic environment, the material will be passed on instead of the students.

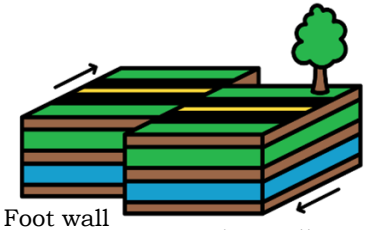
These classifications provide insights into the tectonic forces and movements within the Earth's crust at different plate boundaries and geological settings.

Guide the discussion to identify geologic features that can form in each fault. For example, valleys are formed in normal faults.

Highlight the relevance of understanding fault types in earthquake preparedness and mitigation efforts.

STATION 3

Type of fault: Strike-Slip Faults
Fault Plane Angle: Nearly vertical, with minimal inclination from the horizontal.
Direction of Slip: Horizontal motion where the movement is predominantly lateral along the fault plane. Strike-slip faults are common in transform plate boundaries, where two tectonic plates slide past each other horizontally.



Generation of Seismic Activity: Strike-slip faults form in areas undergoing lateral tectonic stress, where the Earth's crust is moving horizontally past each other. Stress builds up along the fault plane due to the friction between the moving plates. When the frictional resistance is overcome, the rocks on either side of the fault suddenly slip past each other, releasing energy in the form of seismic waves.

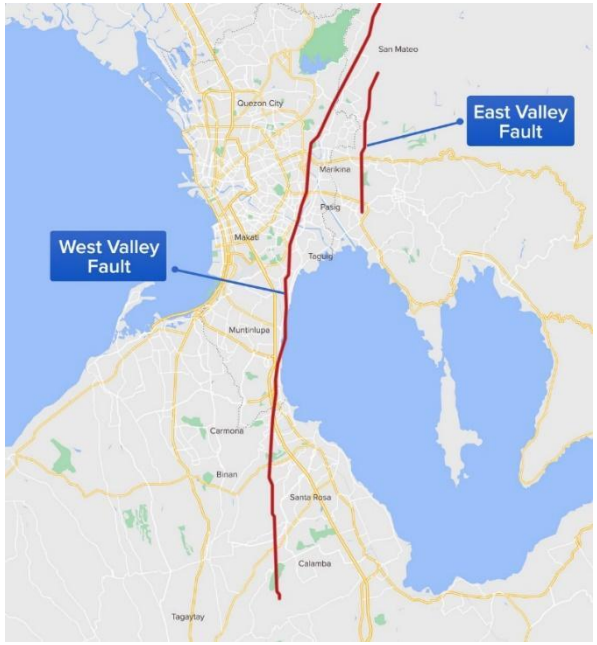
STATION 4

In the Philippines, the most common types of faults are typically strike-slip faults and thrust (reverse) faults. The country is located along the boundary of the Philippine Sea Plate and the Eurasian Plate, where the movement is predominantly lateral (strike-slip) and compressional (thrust). These types of faults are responsible for the significant seismic activity and earthquakes experienced in the region.

3. Lesson Activity

Are You in a Safe Location?

Let the learners analyze the Philippine East and West Valley Fault lines and answer the processing questions.



Processing Questions:

Which locations does the West Valley Fault passed through? How about the East Valley Fault? Considering your location, do you think you are safe?

Image retrieved at: https://www.lamudi.com.ph/journal/wp-content/uploads/2022/07/Marikina-Valley-Fault-Easy-Pasige.com-.jpg lifted on

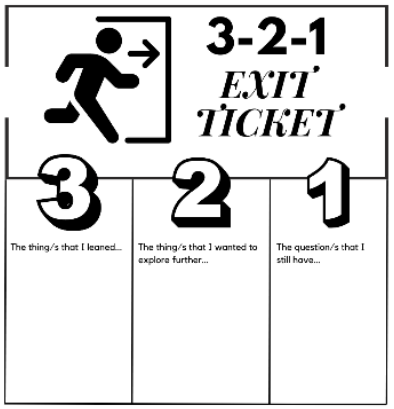
A printed copy of the map may aid the presentation of the lesson.

Discuss that the Philippine Fault Zone (PFZ) is a transform boundary formed by the movement of the Philippine Sea Plate and the Eurasian Plate.

The Marikina Valley Fault System (MVFS) is the most active fault line in the Philippines.

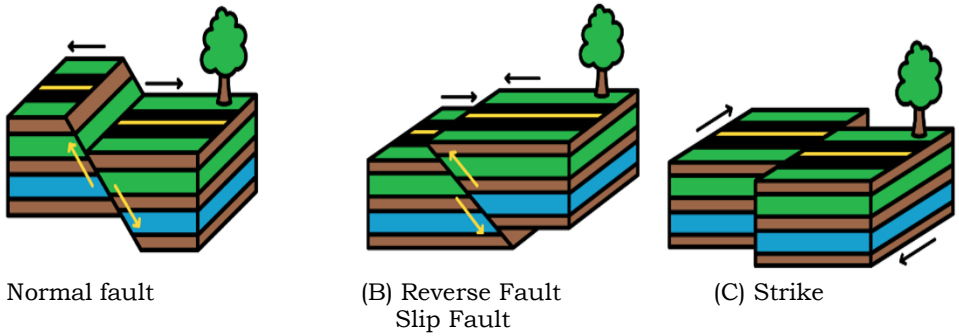
Discuss the active and inactive faults.

Active faults are structures where we expect displacement to occur. Because a shallow earthquake is a mechanism that causes displacement across a fault, they must all occur on active faults. Inactive faults are features that we can recognize but do not produce earthquakes.

D. Making Generalizations	**Day 4** • **Learners' Takeaways** Ask the learners the following questions: 1. What are the 3 types of faults? Classify them according to angle and direction of movement? 2. How are faults related to the generation of earthquakes? 3. How does understanding the fault, fault lines, and its location help you in keeping you and your family safe? **Reflection on Learning**  **3-2-1 Exit Ticket** Allow the learners to reflect on their learning by answering the 3-2-1 exit. 3 - The things that I learned. 2 – The things that I wanted to explore further. 1 – The question/s that I still have. After 5 minutes, ask some learners to share their answers with the class.	Asking these questions will help you check what the learners understood and what further concepts need clarification.

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**1. Formative Assessment** *Part I.* For each scenario below, determine the type of fault based on the given angle of the fault plane and the direction of slip. Choose your answer from the illustration that follows.	

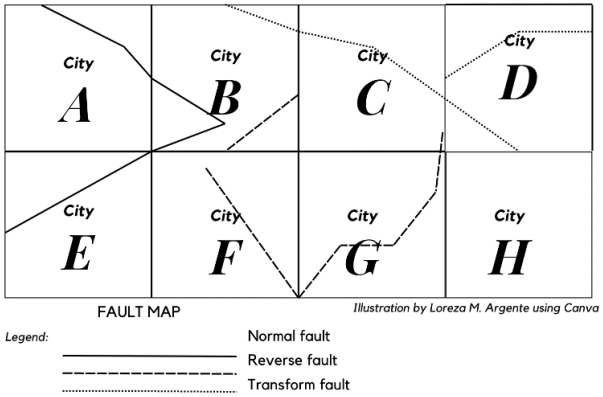
1. The fault plane is inclined at an angle greater than 45 degrees from the horizontal, and the hanging wall moves upward relative to the footwall.
2. The fault plane is nearly vertical, and the movement is predominantly lateral along the fault plane.
3. The fault plane is inclined at an angle less than 45 degrees from the horizontal, and the hanging wall moves downward relative to the footwall.



Normal fault (B) Reverse Fault Slip Fault (C) Strike

Illustration by Loreza M. Argente using Canva

Part II. Analyze the fault map below.



FAULT MAP

Illustration by Loreza M. Argente using Canva

Answers:
Part I.
1. (B) Reverse Fault
2. (C) Strike-Slip Fault
3. (A) Normal Fault

Part II.
The safest city is City H because no fault was found in the area.

2 points – if the learner chose city H and explained why.
1 point – if the learner chose city H but did not explain why.
1 point if the learner chose a different city but did not explain why.

<table>
<tr><td></td><td colspan="3">Analyze the fault map above to decide on the safest city to reside. Briefly explain your answer.

2. Homework
Use the fault finder using your browser to locate the nearest active fault in your area.
Link:earthquakesultfinder.phivolcs.dost.gov.ph/</td><td>The homework is optional.</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>