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Science

Quarter 1 – Module 1: Volcanoes, Earthquakes, and Mountain Ranges

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Secretary: Leonor Magtolis Briones
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Development Team of the Module

Writer:	Arlene T. Abellera
Editors:	Agnes P. Alcantara, Gilbert S. Baysic, Analyn D. Tulagan
Reviewers:	Jaime Campos, Jr. , Villamor Q. Gloria, Ma. Criselda G. Ocang, Rica C. Macam, Jesusa V. Macam, Gina A. Amoyen, Mary Ann Grace C. Dulay
Illustrators:	Bobbit Dale M. Bulatao, Marte B. Ilumin, Anjo C. Layoso
Layout Artists:	Bobbit Dale M. Bulatao Noel Valedict R. Imus
Management Team:	Tolentino G. Aquino, Arlene A. Niro, Editha R. Pridas Gina A. Amoyen, Editha T. Giron, Arlene B. Casipit, Ellen C. De Guzman

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Department of Education – Region I

Office Address: Flores St., Catbangen, City of San Fernando, La Union
Telefax: (072) 682-2324; (072) 607-8137
E-mail Address: region1@deped.gov.ph

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Quarter 1 – Module 1: Volcanoes, Earthquakes, and Mountain Ranges

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pretests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the posttest to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

How will you describe the Earth? You might say, it is big and sturdy. Others might say, it is covered with land and water. It is a place filled with different landscapes and landforms such as mountains and volcanoes. But do you know how these landforms are developed or how do they relate to earthquake epicenters?

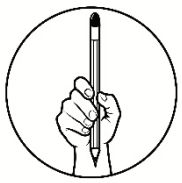
This module will provide you with information and simple activities that will help you understand Plate Tectonics based on the distribution of active volcanoes, earthquake epicenters, and mountain ranges on our planet.

After going through this module, you are expected to:

1. describe and relate the distribution of active volcanoes, earthquake epicenters, and major mountain belts to Plate Tectonic Theory ***(S10ES – Ia-j-36.1)***;
2. enumerate ways to ensure disaster preparedness during earthquakes, tsunamis, and volcanic eruptions; and
3. suggest ways by which one can contribute to government efforts in reducing damage due to earthquakes, tsunamis, and volcanic eruptions.

Going through this module can be a meaningful learning experience. All you need to do is make use of your time and resources efficiently. To do this, here are some tips for you:

1. Take the pretest before reading the rest of the module.
2. Take time in reading and understanding the lesson. Follow the instructions carefully. Do all activities diligently. It is better to be slow but sure than to hurry and miss the concepts you are supposed to learn.
3. Use a separate sheet of paper for your answers in each activity or assessment. Don't forget to write your name. Label it properly.
4. Try to recall and connect the ideas about the Earth that you had in the lower years. Use the concept discussed in the lesson to explain the results of the activities or performance tasks.
5. Be honest. When doing the activities, record only what you have observed. Take the assessments after each activity, but do not turn to the Answer Key page unless you are done with the entire module.
6. Don't hesitate to ask. If you need to clarify something, approach or contact your teacher or any knowledgeable person available to help you. You may also look into other references for further information.
7. Take the posttest prepared at the end of the module, so you can assess how much you have learned from this module.
8. You can check your answers in the activities, self-assessments, and posttest after you finished the entire module to know how much you have gained from the lesson and the activities.



What I Know

Directions: Read each item carefully. Write only the letter of the correct answer for each question. Use a separate sheet for your answers.

1. What is the outermost layer of the Earth?
   A. crust B. inner core C. mantle D. outer core

2. The crust and upper mantle make up Earth's _____.
   A. asthenosphere B. continents C. core D. lithosphere

3. Which statement about the Earth's crusts is **CORRECT**?
   A. Continental and oceanic crusts have the same weight.
   B. Continental crust is heavier than oceanic crust.
   C. Continental crust is thicker than oceanic crust.
   D. Oceanic crust is thicker than continental crust.

4. What do we call the continuously moving part of the earth's crust?
   A. fault B. fissure C. fracture D. plate

5. Which theory states that the entire crust is broken and is continuously moving?
   A. Continental Drift C. Seafloor Spreading
   B. Plate Tectonics D. Titanic Theory

6. Which of the following is **NOT** a result of Plate Tectonics?
   A. earthquake B. fault lines C. landslides D. mountains

7. This earthquake type happens when the shifting of Earth's plates is driven by the sudden release of energy within some limited region of the rocks of Earth.
   A. aftershock B. foreshock C. tectonic D. volcanic

8. How are tsunamis created?
   A. A submarine earthquake causes a huge amount of water to be displaced.
   B. Differences in temperature cause hot seawater to rise.
   C. The gravitational pull of the moon causes the ocean water to rise.
   D. Topography underwater causes disturbances in the oceans' current.

9. A landmass that projects well above its surroundings is a mountain. What do you call a chain of mountains?
   A. mountain area C. mountain range
   B. mountain chain D. mountainous

10. It is the location on the Earth's surface directly above the focus of an earthquake.
   A. center B. direct center C. epic center D. epicenter

11. Plates float on the surface of the mantle. Which plate pushes the Philippine Plate toward the Eurasian Plate?
    A. Cocos Plate
    B. Indo-Australian Plate
    C. Nazca Plate
    D. Pacific Plate

12. If an earthquake begins while you are in a building, the safest thing for you to do is _____.
    A. call home
    B. duck near a wall
    C. get under the strongest table, chair, or other pieces of furniture
    D. lie flat on the floor and cover your head with your hands

13. Why is it important to be aware of places prone to earthquakes?
    A. to identify what crop must be stored
    B. to identify when to evacuate
    C. to locate where to stay best
    D. to perform necessary precautions

14. Which statement does best describe the location of the majority of earthquake epicenters relative to the location of volcanoes around the world?
    A. They are far adjacent.
    B. They are always 3 kilometers away from each other.
    C. They are situated at the same location.
    D. They are not necessarily relevant.

15. How will you relate the distributions of mountain ranges, earthquake epicenters, and volcanoes?
    A. Mountain ranges are found in places between where volcanoes and earthquake epicenters are also situated.
    B. Mountain ranges are found in places where volcanoes and/or earthquake epicenters are also situated.
    C. Mountain ranges are found only in places where earthquake epicenters are situated.
    D. Mountain ranges are found only in places where volcanoes are situated.

Answer Key on page 30

How did you find the pretest? What was your score? If you got 15 items, you may not take this module. But if your score is 14 and below, you must proceed with the module.

Have fun in learning about Plate Tectonics! God bless you!

Lesson 1 Volcanoes, Earthquakes, and Mountain Ranges

What's In

Our country is part of the Pacific Ring of Fire. Thus, we often experience earthquakes, and we are home to many majestic but terrible volcanoes. These topics were discussed in Grade 8 and 9 Science.

Directions: Do you still remember your discussions during your Grades 8 and 9 about volcanoes and earthquakes? You need to recall important words related to volcanoes and earthquakes that will be used in this module. Below is a vocabulary word list with missing letters. Read the definition on the left side to complete each word on the right side. Write your answers on a separate sheet of paper.

Definition	Vocabulary Word
1. A volcano with accounts of eruption documented within 10,000 years (*2 words*)	1. A_T_V_ VO_C_NO
2. A big body of land on the globe	2. _O_ _IN_ _T
3. A vibration of Earth due to the rapid release of energy	3. E_ _T_ _U_KE
4. The location on the Earth's surface directly above the focus of an earthquake	4. _PI_ _N_ _R
5. The exact site of the origin of an earthquake, below the epicenter	5. F_C_ _
6. The liquid rock below the Earth's surface	6. _A_MA
7. A landmass that projects well above its surroundings; higher than a hill	7. M_U_TA_ _
8. A chain of mountains (*2 words*)	8. _OU_TA_N R_N_E
9. Earthquake waves (*2 words*)	9. _E_SM_C W_V_S
10. The first type of seismic wave to be recorded in a seismic station, these compression waves are the fastest and travel through solids, liquids, and gases (*2 words*)	10. P_IM_RY _A_ _
11. The second type of earthquake wave to be recorded in a seismic station; these shearing waves are stronger than P-waves, but only move through solids (*2 words*)	11. _E_ _ND_ R_ WAVE
12. The graphical record of an earthquake	12. _E_S_OG_A_

13. A measuring instrument for detecting and measuring the intensity and direction and duration of movements of an earthquake	13. S_I_ _O_RA_H
14. A Japanese term for "big wave in the port;" generated during undersea quakes	14. _S_NA_I
15. A mountain or hill, typically conical, having a crater or vent through which lava, rock fragments, hot vapor and gas is being or have been erupted from the earth's crust	15. _OL_ANO

How many words do you remember? You may refer back to these pages when you want to recall the definition of the listed terms.

Our Earth has four layers consisting of different materials, namely, crust, mantle, inner, and outer core. For this module, we will focus on the lithosphere which is composed of the crust and the upper mantle.

The lithosphere is said to be in constant but very slow motion. These motions are not the same everywhere. This movement of the lithosphere is called tectonics.

According to the Plate Tectonics Theory, the entire lithosphere of the Earth is broken into numerous segments called plates (***see Figure 1***). The arrows show the direction of the plate movement and the other lines are the fault lines.

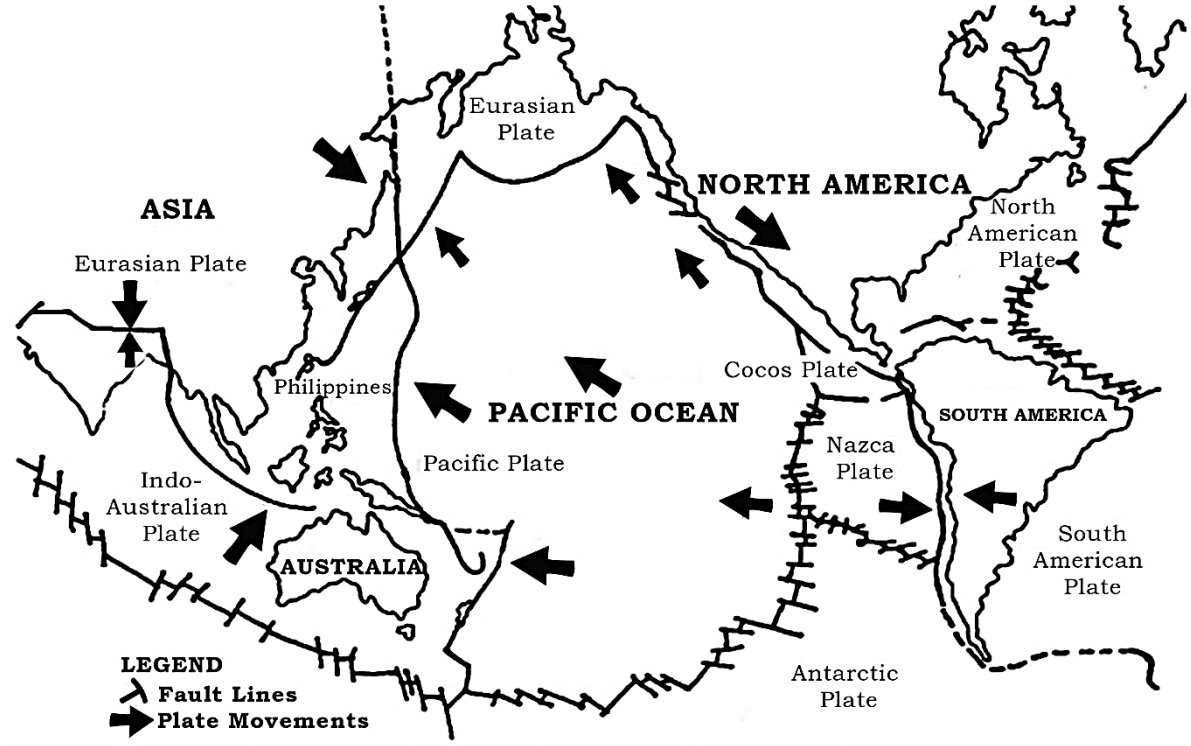


Figure 1. Moving Plates of the Earth

Illustrators: Anjo C. Layoso & Bobbit Dale M. Bulatao, adapted with modifications from https://ase.tufts.edu/cosmos/view_picture.asp?id=280

Do you notice in Figure 1 that there are seven relatively large plates and several smaller ones, including the Philippine plate? Can you remember all their names? Please do the activity below to see how these plates relate to earthquakes, volcanism, and mountain formation.

Note to the Subject Teacher/Facilitator:
The next activity entails the use and close examination of maps. These maps need to be cut and placed on top of one another. You have the option to either attach a photocopy of the entire page 8 to each learner's SLM or ask the learners to trace each map on a piece of bond paper.

What's New

Remember Where the Edges Meet

What you need:

- ✔ separate sheet of paper
- ✔ ball pen
- ✔ copy of page 8 maps of active volcanoes, earthquake epicenters, and major mountain ranges (photocopied or traced, for cutting)
- ✔ small world map (page 9)
- ✔ scissors
- ✔ bright light source (sunlight, lamp, flashlight or cellphone flash)

What you have to do:

1. Get a separate sheet of paper for your answers and observation. Do not copy the questions, just write your answers or observations.

2. Study **Map 1** (Distribution of Earthquakes) on page 8 that shows the earthquake distribution around the world. The dark areas are the earthquake epicenters. Take note of the areas where they are closely situated. Answer the following questions:
   a. How are earthquakes distributed on the map? _____
   b. Where are they situated? _____
   c. Look at your world map on page 9 and compare the earthquake epicenters. Name the country/ies where earthquakes may not happen.
   _____
   d. Why are there no earthquakes on the country/ies you mentioned?
   _____

3. Study **Map 2** (Earth's Major Volcanoes) on page 8. Take note that the dark dots are the active volcanoes.
    e. How are volcanoes distributed? _____
    f. Where are they situated? _____
    g. Based on the map, which country/ies will unlikely experience a volcanic eruption? _____

4. **NOTE:** To be able to perform this activity, you need cutouts of the maps on page 8. Your subject teacher may or may not be able to send you a photocopy of this page so you may either ask your home facilitator to photocopy it for you or you may trace each map on a clean sheet of bond paper.

   Cut your photocopied/traced Map 1 and Map 2 along the edges Place Map 1 (Earthquakes) over Map 2 (Volcanoes).
   NOTE: Remember to place the edges of the continents of each map exactly on top of each other.

5. Bring the maps over any of the bright source of light available (ceiling lamp, sunlight, flashlight/cellphone light). Make sure you can see where the dark areas and dots are.
    h. How do you compare the location of majority of earthquake epicenters with the location of volcanoes around the world?
    _____

6. Study **Map 3** (Mountain Chains), the coarse and darker areas are the mountain ranges of the world.

7. Cut your photocopied/traced Map 3 along the edges. Place it under Map1 and Map 2.
   NOTE: Read first the descriptions below each arrow, then cut these maps individually along the dotted lines.

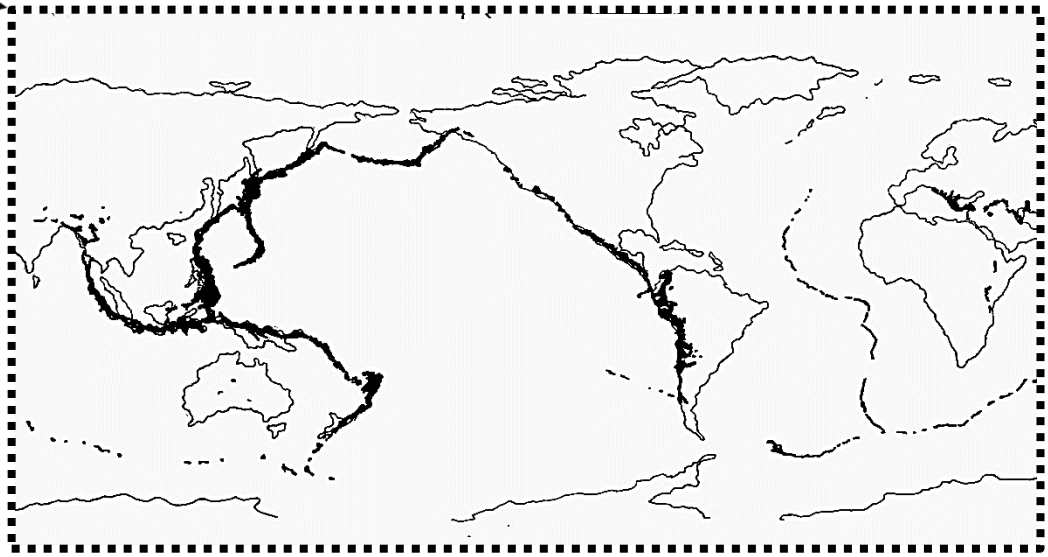
8. Bring the maps over any bright source of light available.
    i. How will you relate the distribution of mountain ranges with the distribution of earthquake epicenters and volcanoes?
    _____

9. Now that you have seen the location of volcanoes, mountain ranges, and majority of earthquake epicenters, study **Figure 1** on page 5 (Map of Moving Plates) once more.
    j. What do you think is the basis of scientists in dividing Earth's lithosphere into several plates? _____

NOTE: **Read** first the descriptions below each arrow, then **CUT YOUR COPY OF THESE MAPS** individually along the broken lines. See to it that Map 1 is placed over Map 2, and Map 2 is over Map 3.

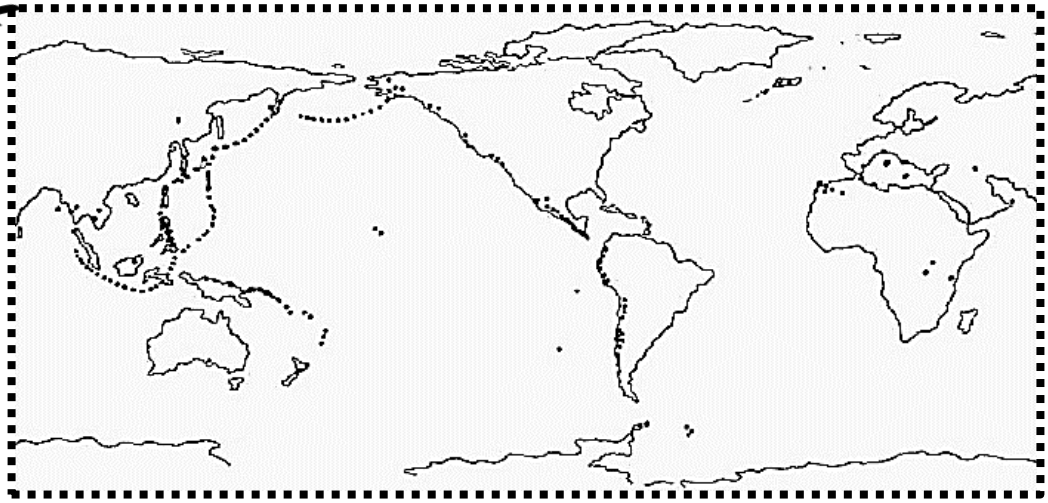
Map 1

The dark areas are the **earthquake epicenters**.



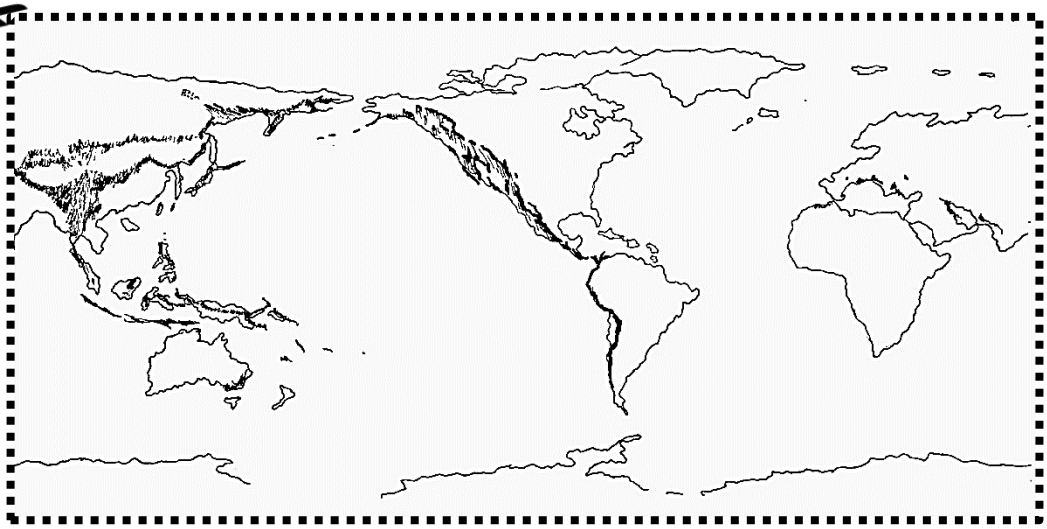
Map 2

The dark dots are **active volcanoes**.

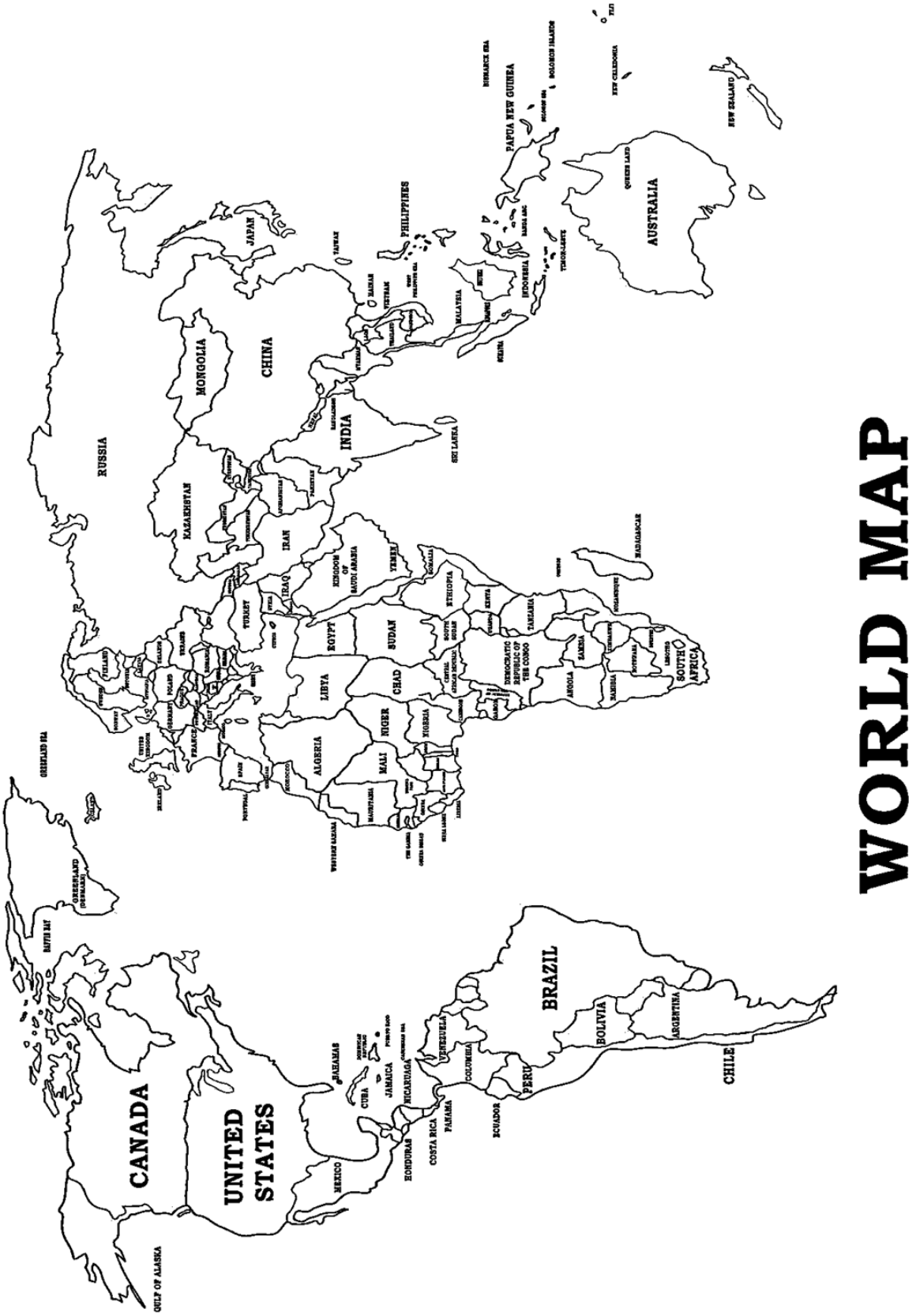


Map 3

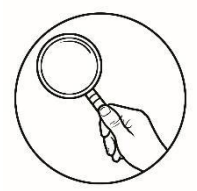
The coarse and darker areas are the **mountain ranges**.



Illustrated by Anjo C. Layoso



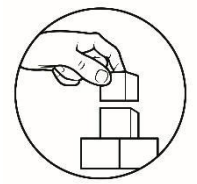
Illustrators: Anjo C. Layoso & Bobbit Dale M. Bulatao, adapted with modifications from https://media.istockphoto.com/illustrations/world-map-in-black-and-white-illustration-id477707738?s=612x612



What is It

What did you observe in the previous activity? Did you find the earthquake epicenters, volcanoes, and mountain ranges close to each other if not situated in the same locations? Have you ever wondered how this could be possible?

Remember that plates are in constant motion. As they interact along their margins, important geologic processes take places, such as the formation of major mountain ranges, active volcanoes, and earthquake epicenters. It means to say that, where there are earthquakes, crusts can either meet or move apart and form mountains and volcanoes.



What's More

You proved the worldwide evidence of Plate Tectonics with our earlier activity. Here are some enrichment activities for you to work on to strengthen the basic concepts you have learned from our mini-lesson and to validate your observations in the activity part.

Activity 1. Re-circle the Ring

Plate movements may result in earthquakes. Earthquakes may happen anytime, either on land or underwater. Earthquakes on land can be caused either by tectonic plates movement or volcanic eruptions. Earthquakes under the sea can cause a tsunami.

Our country, the Philippines, is situated in a place where Plate Tectonics is very evident the Ring of Fire. It is a long chain of volcanoes and other tectonically active structures that surround the Pacific Ocean. The Ring of Fire is one of the most geologically active areas on Earth and a site for frequent earthquakes and powerful volcanic eruptions.

What you need:

- ✔ separate sheet of paper and ball pen
- ✔ small world map (see attached map on page 9)

What you have to do:

1. Get a separate sheet of paper for your answers and observations. Do not copy the questions.

2. Study **Figure 2** below. It shows the active volcanoes (triangles) all over the Pacific region. Go back to Figure 1 on page 5 to see again the moving plates. You will realize that the volcanoes in Figure 2 are also situated in the areas of plate movement.

3. Answer the following questions:
   a. Using the map in Figure 2, which volcanoes are familiar to you? Why?
   _____
   b. Why is this area called the Pacific Ring of Fire? _____

Figure 2. Active Volcanoes in the Ring of Fire

Illustrators: Anjo C. Layoso & Bobbit Dale M. Bulatao, adapted with modifications from https://sites.google.com/site/naturaldisasteroutbreak/_/rsrc/1333491357502/disease-outbreak/ringfire.gif?height=307&width=400

Let us see if you have grasped the essence of our first enrichment activity. Answer the assessment on the next page.

Assessment 1

Directions: Read each item carefully. Write only the letter of the correct answer for each question. Use a separate sheet of paper for your answers.

1. Which ocean has the ring of volcanoes around it?
   A. Artic B. Atlantic C. Indian D. Pacific
2. Which famous Philippine volcano is usually seen in world maps due to its violent eruption in 1991?
   A. Bulusan B. Kanlaon C. Mayon D. Pinatubo
3. Look back at Figure 1 on page 5. All of these plates are in the Pacific Ring of Fire, **EXCEPT** ____.
   A. Cocos B. Eurasian C. Nazca D. North American
4. All of these have volcano or earthquake activity **EXCEPT** _____.
   A. Australia B. Japan C. Mexico D. Philippines
5. How do you describe the location of earthquake epicenters, active volcanoes, and moving plates in the Pacific Ring of Fire?
   A. They are all over the place.
   B. They are concentrated in one area.
   C. They are situated in the same location.
   D. They are strategically plotted in clusters.

Activity 2. Rethink the Risks

You have seen the maps of the Pacific Ring of Fire in the previous activity. This time let's see how our country, Philippines, is at risk of disasters related to geologic activities. As we are known to be resilient (flexible), we have high hopes that our resilience could also mean preparedness at all times.

What you need:

- ✔ separate sheet of paper and ball pen
- ✔ Philippine geographic/political map (see page 13)

What you have to do:

1. Go to page 13. Look at the Philippine map. Can you pinpoint where you are now?

2. Study the hazard maps found on pages 14-17 that will show you areas in our country that are prone to natural disasters like earthquakes (**Figure 3**), landslides **Figure 4**), volcanic eruptions (**Figure 5**), and tsunamis (**Figure 6**).

3. Look at the geographical or political map of the Philippines on page 13. Try to compare the areas in Figures 3 to 6 (pages 14-17) provinces with darker colors. These are the high-risk areas to the specified natural disasters.

POLITICAL MAP OF THE PHILIPPINES

Illustrated by Anjo C. Layoso and Bobbit Dale M. Bulatao, adapted with modifications from https://en.wikipedia.org/wiki/Regions_of_the_Philippines

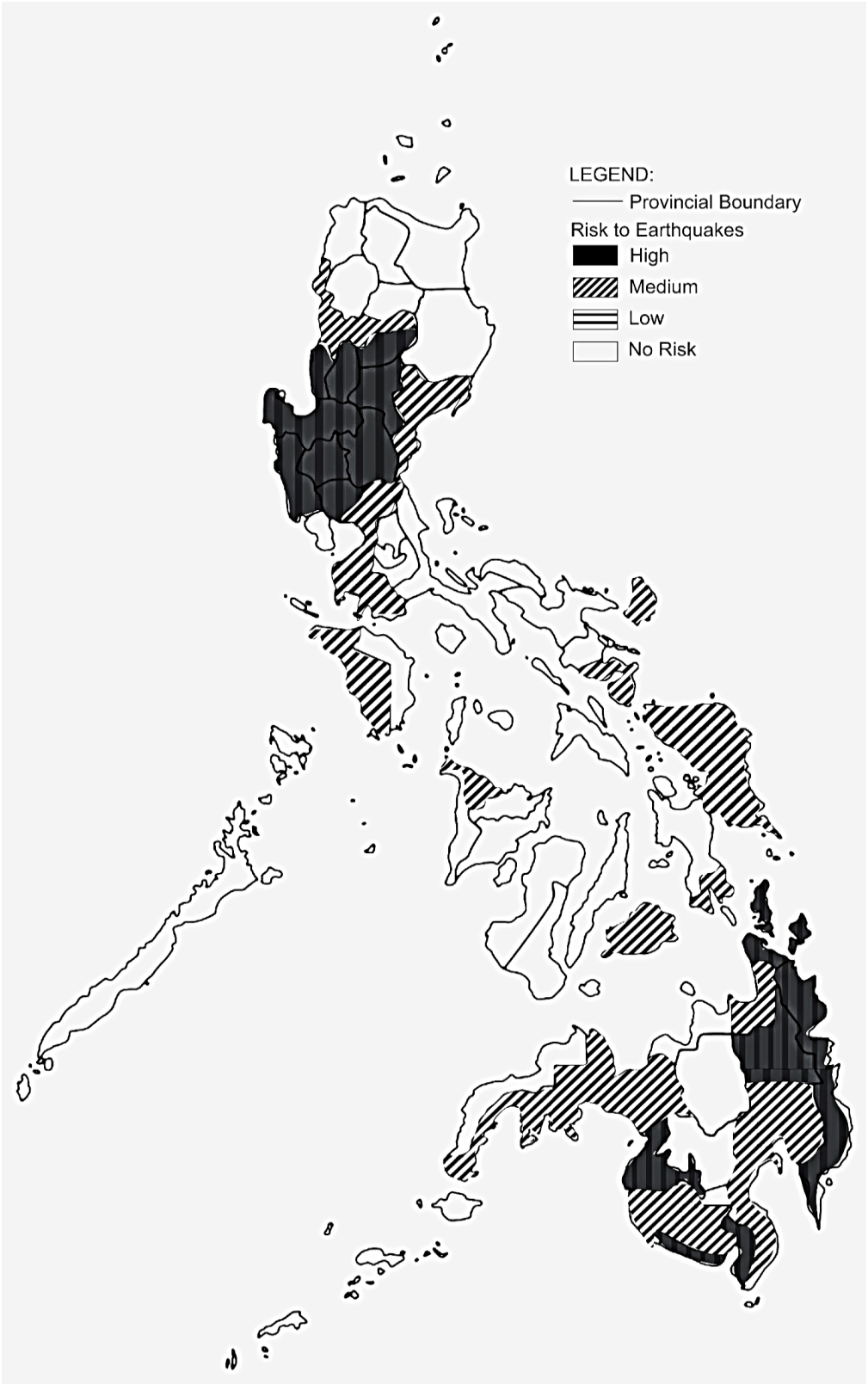


Figure 3. Risks to Earthquakes

Illustrated by Marte B. Ilumin and Anjo C. Layoso

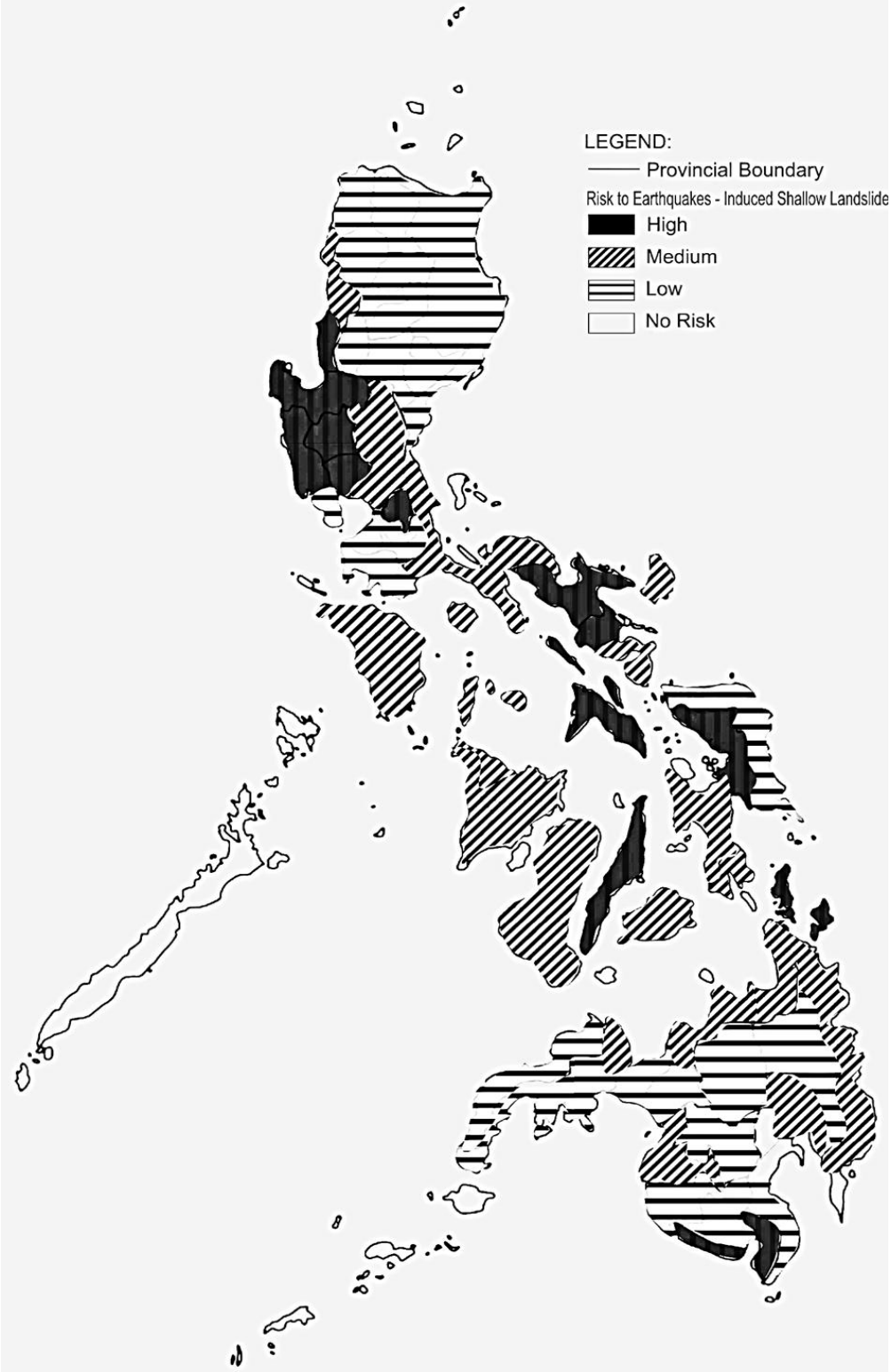


Figure 4. Risks to Landslides Induced by Earthquakes

Illustrated by Marte B. Ilumin and Anjo C. Layoso

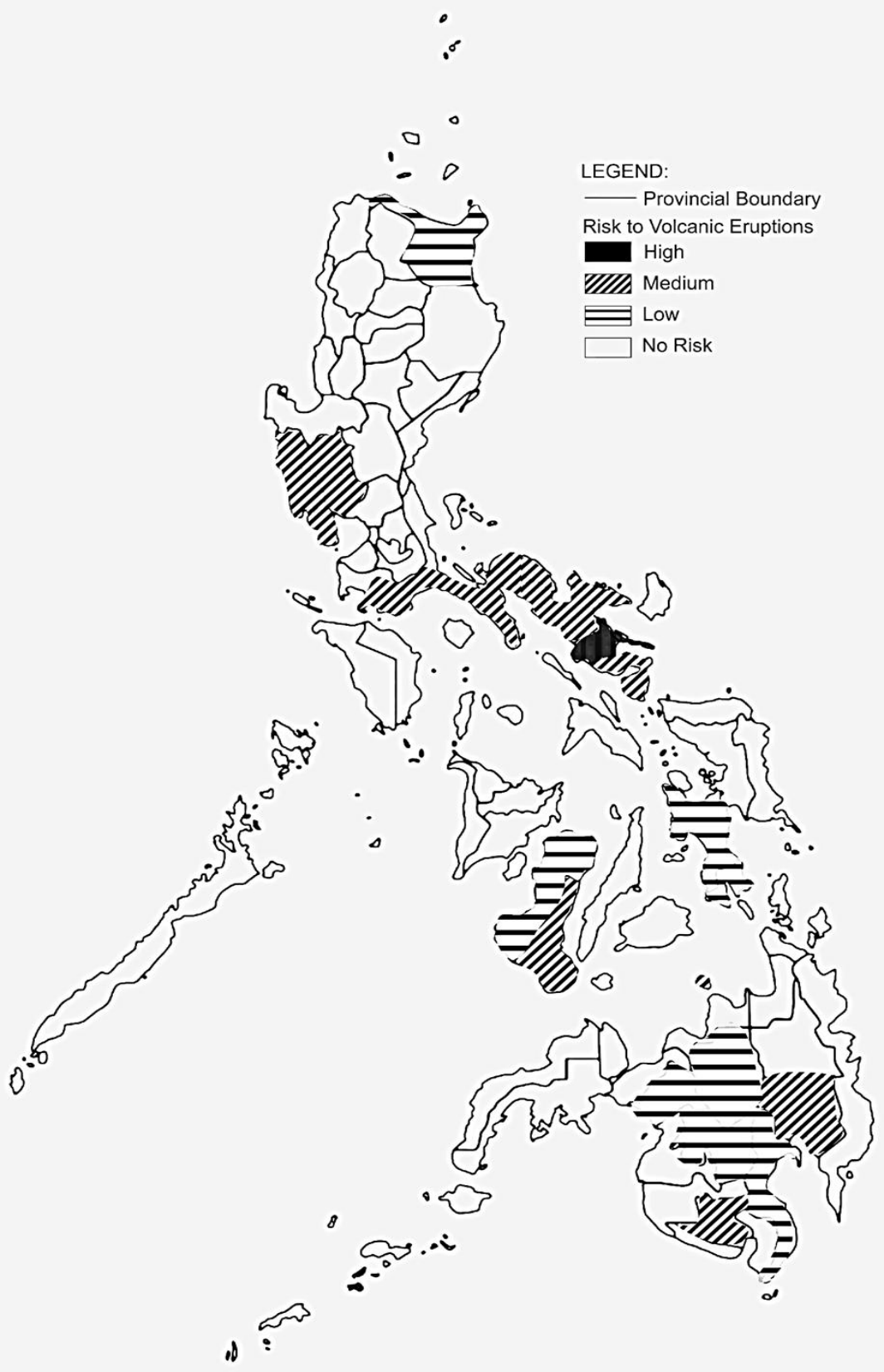


Figure 5. Risks to Volcanic Eruptions

Illustrated by Marte B. Ilumin and Anjo C. Layoso

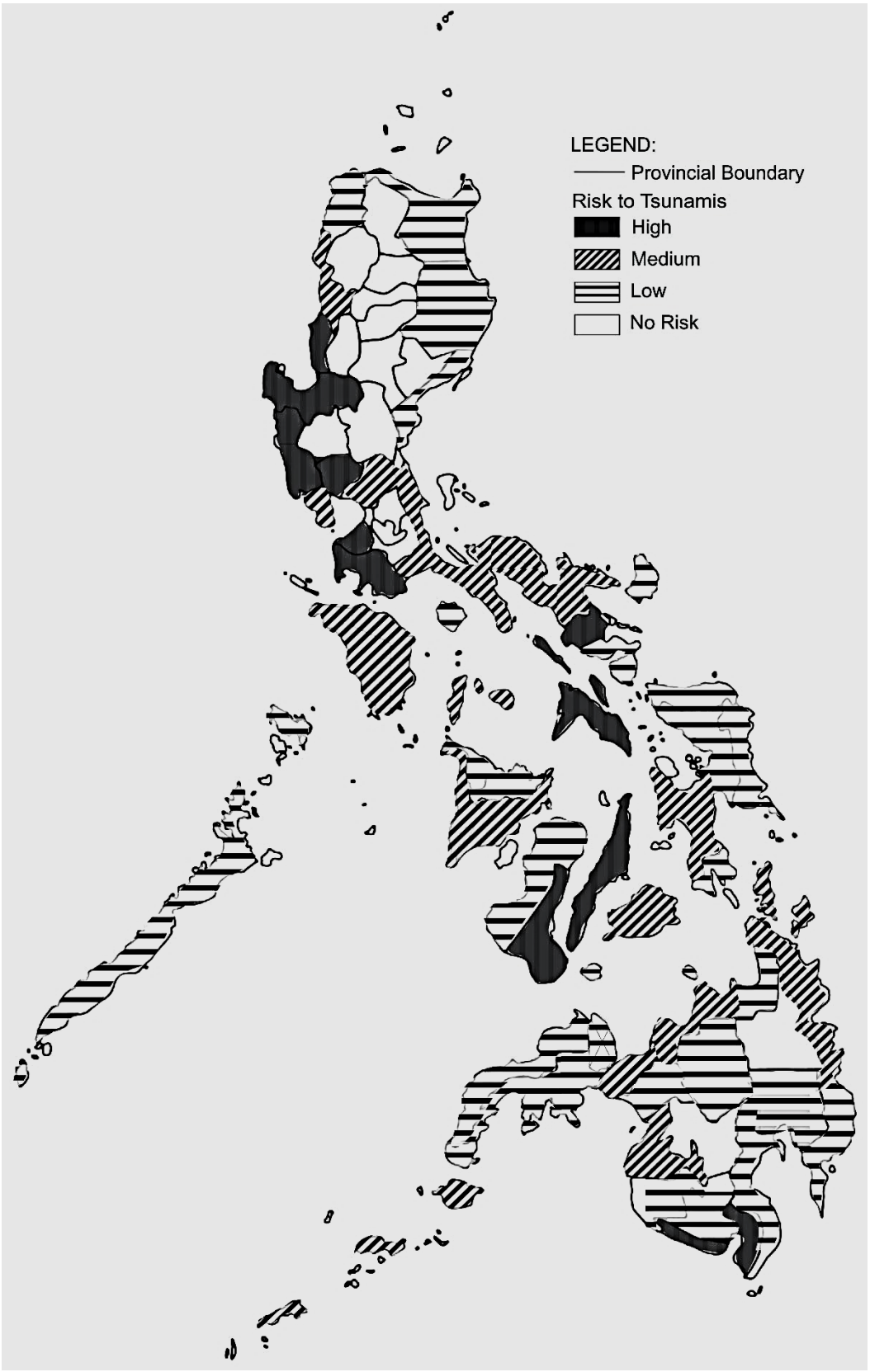


Figure 6. Risks to Tsunamis

Illustrated by Marte B. Ilumin and Anjo C. Layoso

4. Get a separate sheet of paper for your answers and observations. Do not copy the questions.
   a. Which regions are high-risk (darkest shade) in terms of:
      1) earthquakes? _____
      2) landslides? _____
      3) volcanic eruptions? _____
      4) tsunamis? _____
   b. Are there regions where all the four risks are highly present? List them down.
      _____
   c. If you will choose a province to live, where will it be? Why? _____

How did you find the hazard maps in the previous activity? Did you see your province as one of the epicenters? When was the last time you experienced an earthquake? How was your experience? It's now time to test your knowledge so answer Assessment 2.

Assessment 2

Directions: Read each item carefully. Write only the letter of the correct answer for each question. Use a separate sheet of paper for your answers. You may refer to the Philippine maps from page 13-17.

1. It is a region where all the risks are present.
   A. Region 2 B. Region 3 C. Region 4 D. none
2. It is the safest place in the country due to its very low risk in geologic disasters.
   A. Batanes B. Isabela C. Palawan D. Romblon
3. What is the common precursor (something that happened or existed before another event) of the natural disasters?
   A. earthquake B. landslide C. tsunami D. volcanic eruption
4. Which region is prone to earthquakes but not to a volcanic eruption?
   A. Cagayan Valley C. Metro Manila
   B. Eastern Visayas D. Northern Mindanao
5. In which province should people refrain from building high rise houses?
   A. Agusan Del Norte C. Camiguin
   B. Benguet D. Davao

After knowing the location of natural disaster risks in our country, it is now time to improve your disaster preparedness skills. Do the next activity below:

Activity 3. Risk-free and Prepared!

All these risks identified in the Enrichment Activity 2 can cause harmful effects to our environment, our country as a whole, and our communities in particular. These may even result in the death of people who are not prepared for these natural disasters.

As a student, are you prepared when these disasters strike? Do the next activity to ensure your disaster preparedness during earthquakes, tsunamis, and volcanic eruptions.

What you need:

- ✔ separate sheet of paper and ball pen

What to do:

1. Get a separate sheet of paper. Copy Table 1 and provide enough space for your answers.

Table 1. Geologic Disaster Preparedness

Geologic Event	**Harmful Effect/s**	**What to Do**		
		Before	**During**	**After**
Earthquake				
Landslide				
Tsunami				
Volcanic Eruption				

2. Look for information about the harmful effects of an earthquake, tsunami, and volcanic eruptions. You may read from news articles or interview older persons. Write it in the second column of Table 1.
3. List down things to do before, during, and after each geologic disaster to ensure disaster preparedness.
4. During natural disasters, I should _____.

You did well! It's now time to assess your understanding. Do your best!

Assessment 3

Directions: Read each item carefully. Write only the letter of the correct answer for each question. Use a separate sheet of paper for your answers.

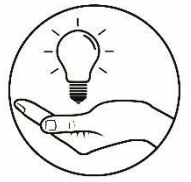
1. If an earthquake begins while you are in a building, the safest thing for you to do is _____.
   A. call home
   B. duck near a wall
   C. get under the strongest table, chair, or other pieces of furniture
   D. lie flat on the floor and cover your head with your hands

2. Why is it important to be aware of places prone to earthquakes?
   A. to identify what crop must be stored
   B. to identify what relief goods to be prepared
   C. to locate where to the next quake will occur
   D. to perform necessary precautions

3. All of these are wise practices during an earthquake **EXCEPT**_____.
   A. cover your head
   B. duck under the table
   C. park your car
   D. run to a tall tree

4. Tsunami comes when you suddenly observe the ocean water moving away from the beach. To save yourself from this calamity, you **MUST** _____.
   A. call the police
   B. run to the nearest hill or mountain
   C. stay in the middle of the beach
   D. take the time to pick up seashells

5. What can be the **WORST** and **IRREVERSIBLE** effect of negligence or failure to prepare for natural geologic disasters?
   A. damage to properties
   B. death
   C. disease
   D. poverty



What I Have Learned

Great job! You are almost done with this module. Let's summarize what you have learned from the lesson and activities by choosing the correct word inside the parentheses. Use a separate sheet of paper and write only your answer.

1-3. The crust and a part of the upper mantle make up the (continent, lithosphere). It is subdivided into portions called plates. (Continents, Plates) are large pieces of the upper few hundred kilometers of Earth that move as a single unit as it (floats, moves) above the mantle.

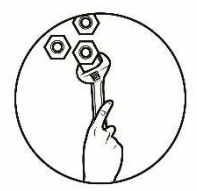
4-5. There are two kinds of crust: (Continental, Crustal) plates which are thicker but less dense, and Oceanic plates which are thinner but (compact, denser).

6-8. Plate Tectonics is a (law, theory) which suggests that Earth's crust is made up of plates that constantly (move, rotate) and interact in various ways, thus, producing earthquakes, mountains, volcanoes, and other (geologic, land) features.

9. The plate that pushes the Philippine Plate towards the (Eurasian, Indo-Australian) plate is the Pacific Plate.

10-12. The world's earthquakes, (eruptions, volcanoes), and mountain ranges are not randomly distributed over the Earth's surface. They are both situated at the same (location, place) near the (center, edges) of the continents.

13-15. Geologic activities such as (ethnicity, seismicity) or the occurrence of earthquake, (extravasation, volcanism), and mountain formations are the (basis, reasons) of scientists in dividing Earth's lithosphere.



What I Can Do

NOTE: *This is a make-believe activity. Pretend and internalize the role you are asked to do. Enjoy!*

You are an active member of your school's Supreme Student Government. Your City/Municipal Mayor highly commends and accepts students' participation in solving current problems and issues. Thus, he or she opened a social media page/account where students can communicate openly to him.

On a piece of bond paper, copy the graphic organizer below and write a draft of your social media comment suggesting ways by which you (or the youth) can contribute to government efforts in reducing damage due to earthquakes, tsunamis, and volcanic eruptions. Make sure to enumerate specific steps to achieve your goals or suggestions.

Use the hashtags: **#youthinaction, #disasterpreparedness**. You may also mention or paste/draw pictures of disaster hazards you have observed within your city or municipality that may also catch the attention of your Mayor.

_____
_____ } *hashtags here*

Disaster Hazard Picture 1	Disaster Hazard Picture 2	Disaster Hazard Picture 2

Shout-out to our beloved Mayor! As a student leader of (*mention your school*), I have observed the following disaster hazards _____
_____

May I respectfully suggest the following measures to prevent future damages and death:

_____
_____

We may still be young but_____

Now that you have performed your make-believe performance task, answer briefly and honestly the questions on the next page:

Discussion of Possible Outcomes:

1. What do you think are the keys to the accomplishment of your goals?
2. What do you think are the factors that may hinder your Mayor to accept your suggestions?
3. Do you think your suggestions will be accepted by the people in your locality? Why?

Your output on the make-believe activity will be rated by your teacher according to the following criteria:

Standards Rubric	
Appropriateness (disaster risk reduction)	5 points
Accuracy (taken from real scenario)	5 points
Grammar and Spelling (English and/or vernacular)	5 points
Techniques (persuasiveness/humor in words and pictures)	5 points
TOTAL - 20 points	

Very well done! You are now ready to have your posttest. You may want to go over again the lessons, activities, and maps to review for the final assessment. God bless you!

Assessment

Directions: Read each item carefully. Use a separate sheet of paper for your answers. Write only the letter of the correct answer for each question.

1. Which theory states that the entire crust is broken and is continuously moving?
   A. Continental Drift C. Seafloor Spreading
   B. Plate Tectonics D. Titanic Theory

2. What do we call the continuously moving part of the earth's crust?
   A. fault B. fissure C. fracture D. plate

3. Which of these phrases is **FALSE** about lithospheric plates?
   A. have the same thickness everywhere
   B. include the crust and upper mantle
   C. thickest in the mountain regions
   D. vary in thickness

4. A landmass that projects well above its surroundings is a mountain. What do you call a chain of mountains?
   A. mountain arc C. mountain range
   B. mountain chain D. mountainous

5. Plates float on the surface of the mantle. Which plate pushes the Philippine Plate toward the Eurasian Plate?

A. Cocos Plate
B. Pacific Plate
C. Scotia Plate
D. South American Plate

6. What should you **NOT DO** during an earthquake?

A. cover your head
B. duck under the table
C. park your car
D. run to a tall tree

7. Which is **NOT TRUE** about the location of the epicenter of earthquakes?

A. Some are located along the edges of the continents.
B. Some are located in mid-continents.
C. Some are located in North Asia.
D. Some are located in oceans.

8. Why is it important to be aware of places prone to earthquakes?

A. to identify what crop must be stored
B. to identify when to evacuate
C. to locate where to stay best
D. to perform necessary precautions

9. Where are most volcanoes situated?

A. along fault lines
B. concentrated on continental edges
C. near mountain ranges
D. under the oceanic crust

10. Which famous Philippine volcano is usually seen in world maps due to its violent eruption in 1991?

A. Bulusan B. Kanlaon C. Mayon D. Pinatubo

11. Based on geological hazard maps, what is the safest place in the country due to its very low risk in geologic disasters?

A. Batanes B. Isabela C. Palawan D. Romblon

12. How do you describe the locations of earthquake epicenters, mountain rangers, and moving plates in the Pacific Ring of Fire? They are _____.

A. all over the place
B. concentrated in one area
C. located in the same location
D. strategically plotted in clusters

13. When you see that the ocean water is receding (disappearing) away from the beach, you **MUST**

A. call the police
B. run to the nearest hill or mountain
C. stay in the middle of the beach
D. take the time to pick up seashells

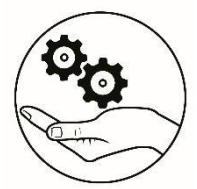
14. What do you think is the basis of scientists in dividing Earth's lithosphere into several plates?

A. brightness of stars and formation of constellations in the sky
B. the cycle of high and low tides during full moon
C. the occurrence of earthquake, volcanism, and mountain formation
D. the uneven distribution of heat in the globe

15. How will you relate the distributions of mountain ranges, earthquake epicenter, and volcanoes?
    A. Mountain ranges are found in places between where volcanoes and earthquake epicenters are also situated.
    B. Mountain ranges are found in places where volcanoes and/or earthquake epicenters are also situated.
    C. Mountain ranges are found only in places where earthquake epicenters are situated.
    D. Mountain ranges are found only in places where volcanoes are situated.

Answer Key on page 31

How was the Assessment? What was your score? Congratulations if you got 12 to 15 items correctly. If your score is below 12, you must review the parts of the lesson that you did not understand well. You may also ask your teacher/facilitator for further explanation of these parts.



Additional Activities

Are you in for more challenging activities? If you are fond of traveling and intend to be a local or international tourist in the future, you might want to spare more time doing some additional activities.

Additional Activity 1. It's More Fun Near Philippine Volcanoes

What you need:

- ✔ separate sheet of paper and ball pen
- ✔ Philippine map (see page 13)
- ✔ Active volcanoes in the Philippines map (see page 25)
- ✔ source of information like books, magazine or the internet (if available)

What you have to do:

1. Get a separate sheet of paper. Copy Table 2 and provide enough space for your answers.

Table 2. Philippine Volcanoes Worth Seeing

Province	Active Volcano	Interesting Facts
1.		
2.		
3.		
4.		
5.		

Figure 7. Active Volcanoes in the Philippines

Illustrated by Marte B. Ilumin & Anjo C. Layoso, adapted with modifications from https://www.phivolcs.dost.gov.ph/vault/images/volcano/volcanoes-of-the-philippines-updated2016_png.png

2. Go back to the Philippine map on page 13 and decide which five provinces you want to visit someday. Make sure you will include places from Luzon, Visayas, and Mindanao. Write down your five choices in the first column of Table 2.

3. Look at the active volcanoes in the Philippines in **Figure 7**, page 25. Locate a volcano that is near to the provinces you have listed on the first column of the Table that you consider worth seeing.

4. Write down the name of the volcano in the second column of Table 2.

5. Look for interesting facts on the volcanoes you have located from any available source like books, magazines, or the internet (if available). List these facts on the third column of the table.

6. Let us say you were on vacation in one of your chosen provinces. On your answer sheet, answer the following questions:
   a. In which hotel will you choose to stay, near a volcano or away from a volcano?
      Why? _____
   b. If you have chosen to stay in a place near a volcano what precautionary measures will you always remember? (You may want to recall your answer to Table 1 on page 19.) _____
   c. Which among the many active volcanoes in the Philippines would you suggest to a foreign friend to visit? Why? _____

Enjoying the beauty of natural sceneries like volcanoes is one delightful activity. But nature is not always calm as we all know. Do you recall any past natural calamities that caused damage and death here or abroad? Kindly do the next activity.

Additional Activity 2. It's Better to be Locally and Internationally Aware

What you need:

- ✔ separate sheet of paper and ball pen
- ✔ Philippine map (see page 13)
- ✔ World map (see page 9)
- ✔ source of information like books, magazine or the internet (if available)

What you have to do:

1. Get a separate sheet of paper. Copy Table 3 on pages 27 and 28 except Column 2. Provide enough space for your answers.

2. Examine each of the pictures in Column 2. Do you know any of these events? Name the calamity each picture shows. Write your answers in the fourth column. Possible answers are earthquakes, landslides, tsunami, and volcanic eruptions.

3. Think of the bad effects of these natural calamities in a certain country or place. Imagine the effects on the health, livelihood, and emotions of the people living in those areas. List down your answer to the last column.
4. We know that the Philippines has suffered from many deadly typhoons, earthquakes, volcanic eruptions, and other natural disasters. How can we attribute these occurrences to our location in the Pacific Ring of Fire? _____

5. How about the countries Nepal and Japan, what could be the cause of the calamities they have experienced? _____

Table 3. Natural Calamities and Their Effects

No.	Picture	Country	Calamity	Effects
1	 *Source: https://www.npr.org/2020/01/13/795815351/volcanic-eruption-in-philippines-causes-thousands-to-flee*	Philippines		
2	 *Source: https://assets.rappler.com/EE52B0AE1BA241DCBAC84512ADBF2FF0/img/F7BDA97B2FEE4B4E884E8A91779A3C3E/itogon-landslide-day2-september-19-2018-017.jpg*	Philippines		

3	 *Source: https://si.wsj.net/public/resources/images/WOAW270_NEPALA_P_20150426185109.jpg*	Nepal		
4	 *Source: https://watchers.news/data/thumbs/798_296/2020/04/japan-tsunami-2011-april-22-2020-ft-img.jpg*	Japan		

Knowing the bad effects of these unstoppable natural calamities, we must always be prepared for them all the time. The best way to prepare is to create awareness and to set a plan with our family and friends before such calamities strike. Perform the last activities with family members or friends who are available to join you. Have a great time collaborating!

Additional Activity 3. It's Time to Boost Our Awareness

What you need:

- ✔ separate sheets of paper
- ✔ a pencil or ball pen
- ✔ a ruler or any straight edge
- ✔ any coloring material (crayons, markers, pencil colors)

What you have to do:

Part A- Evacuation Plan

1. Draw a floor plan or rough draft of your house. Label each room.

2. Identify where the windows and doors are located. These can be your exit points during calamities or emergencies. Label them properly. Color the exit points green.

3. Locate possible hazards or hindrances like tall cabinets, fire or electricity sources, glass objects, or hanging objects that may drop. Draw their exact positions in your house. Label them properly. Color them red.

4. From your bedrooms or sleeping areas, identify the most common safe exit point for your entire family. Then draw a blue arrow from these sleeping areas going to the identified safest exit.

5. Identify the specific locations of your medicine/emergency kit, fire extinguisher, Go bags, and important documents. Draw them also in your plan. Label them properly. Color them yellow.

6. Orient your family about the possible hazards and safest exit. You can have another copy of this plan to be posted in your living room if you wish to. It would also be nice if important emergency hotline numbers are listed on another sheet of paper.

Standards Rubric	
Required Elements (followed the instructions)	5 points
Labels (properly labeled and colored)	5 points
Grammar and Spelling (English and/or vernacular)	5 points
Impact (attractive and neat)	5 points
	TOTAL - 20 points

Part B- Awareness Campaign

1. Collaborate with any of your siblings, parents, cousins, or friends to make these awareness campaigns: slogan, poem, song/jingle, or poster about natural calamities. You have the option to create just one or all the suggested campaign awareness materials depending on your interest, willingness, and time. Focus on natural calamities that often occur in your locality.

2. Your material can be in English, Filipino, or your mother tongue. Avoid foul or vulgar words in your content.

3. Limit your content to the size of one long bond paper.

4. If you choose to make song/jingle indicate the tune you are going to use and the name of the artist who popularized the song.

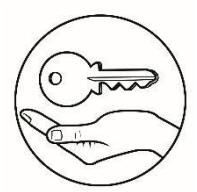
5. Make your final output as presentable as possible observing neatness and readability.

6. You may opt to have a picture of your slogan, poem, and poster, or record your song or jingle and upload it to any social media platform to spread more awareness. **NOTE:** Be a responsible netizen and observe the proper netiquettes when posting materials online. Remember the Golden Rule, “Do unto others what you want others do unto you.”

Standards Rubric

Targets Awareness (words/images are realistic)	5 points
Grammar and Spelling (English and/or vernacular)	5 points
Techniques (persuasiveness/humor in words and pictures	5 points
Impact (attractive and neat)	5 points
TOTAL - 20 points	

It's a great feeling that you were able to challenge yourself to do these additional activities. It is hoped that your understanding and appreciation of your role as a natural calamity awareness advocate were enriched. Congratulations and continue this good deed.



Answer Key

What I Know

1. B	6. C	11. D	15. B
2. C	7. C	12. D	10. D
3. D	8. A	13. C	9. C
4. C	9. C	14. D	5. B
5. A	10. D	15. B	

What's In

1. ACTIVE VOLCANO	6. MAGMA	11. SECONDARY WAVE	15. VOLCANO
2. CONTINENT	7. MOUNTAIN	12. SEISMOGRAM	14. TSUNAMI
3. EARTHQUAKE	8. MOUNTAIN RANGE	13. SEISMOGRAPH	9. SEISMIC WAVE
4. EPICENTER	9. SEISMIC WAVE	14. TSUNAMI	4. D
5. FOCUS	10. PRIMARY WAVE	15. VOLCANO	5. B

Remember Where The Edges Meet

a. The world's earthquakes are not randomly distributed over the Earth's surface. They tend to be concentrated in narrow zones.
b. Some are located near the edges of the continents, some are in mid-continents, while others are in oceans.
c. *Answers may vary*. Some of the possible answers are: large part of the Pacific Ocean, northernmost Asia, majority of Europe, eastern portion of North and South America, and western Africa.
d. It is important to identify areas which are prone to earthquakes so that necessary precautions could be done if ever you're living in one of those places.
e. Volcanoes are not randomly distributed. Majority of them are found along edges of some continents.
f. Majority are found along the edges of some continents, particularly in the western coast of North and South America, East and Southeast Asia
g. *Answers may vary*.
h. Earthquake epicenters and volcanoes are both situated at the same locations.
i. Mountain ranges are found in places where volcanoes and/or earthquake epicenters are also located.
j. Geologic activities such as seismicity (occurrence of earthquake), volcanism, and mountain formation are the basis of scientists in dividing Earth's lithosphere.

Rethink the Risks

a. possible answers:
1. Regions 1, 2, 3, 11, & CAR
2. Regions 1, 3, 5, 7, 8, 12, & CARAGA
3. Region 5
4. Regions 1, 3, 7, & 12
b. none
c. Palawan, no geologic risks.

Re-circle the Ring

a. *Answers may vary*. The most possible answers are: Pinatubo, Fuji, Paricutin, and Mt. St. Helens because they are the popular ones.
b. Active volcanoes, faults, and earthquake epicenters almost surround the Pacific Region.

Assessment 1

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

Assessment 2

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

Assessment 3

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

Risk-free and Prepared!

Geologic Event	Devastating Effects	What To Do		
		Before	During	After
earthquake	Death Damage to properties and infrastructure	1. secure infrastructures 2. prepare "go" pags 3. do earthquake drills	1. drop, cover, hold 2. stay away from debris 3. be alert and help others	1. be aware of aftershocks 2. stay away from damages 3. stay calm and stay to go home
landslide	Death Damage to properties and infrastructure	1. test soil stability 2. plant trees 3. don't live along cliffs	1. go out of your homes 2. go to higher grounds 3. go to safer\ stable grounds	1. stay away from debris 2. don't return to ground zero 3. relocate
tsunami	Death Damage to properties and infrastructure	1. be aware of warnings 2. be aware of the sea level 3. observe map new	1. run to higher grounds 2. stay away from large floating debris 3. swim away from the ocean	1. stay on higher grounds 2. be aware of aftershocks 3. stay away from the beach or ocean
volcanic eruption	Death Damage to properties and infrastructure	1. prepare "go" pags 2. don't live near volcanoes 3. don't live & work in risky areas to activity	1. follow order to evacuation 2. stay away from volcanic debris 3. secure respiratory health	1. stay evacuated until safe to go home 2. be updated 3. relocate if possible

What I Have Learned

1. lithosphere	6. theory	11. location	
2. Plates	7. move	12. edges	
3. floats	8. geologic	13. seismicity	
4. Continental	9. Eurasian	14. volcanism	
5. denser	10. Volcanoes	15. basis	

What I Can Do

(see rubric on page 27)

Assessment

1. B	6. D	11. C	
2. D	7. B	12. C	
3. A	8. D	13. B	
4. C	9. B	14. C	
5. B	10. D	15. B	

Additional Activity 1

Table 2 and Item # 6, letters a to c (answers may vary,1 point per item given)

Additional Activity 2

4. The Ring of Fire is a large Pacific Ocean region where many of Earth's volcanic eruptions and earthquakes occur. This is a reason why the Philippines has suffered many deadly natural disasters.
5. Nepal is on the boundary of two massive tectonic plates – the Indo-Australian and Asian plates causing earthquakes. Japan's tsunami happened because of an earthquake under its sea near a destructive plate boundary.

Additional Activity 2 Part A and Part B (see standards rubrics on page 27)

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For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph *