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UNIFIED SUPPLEMENTARY LEARNING MATERIALS
(USLeM)

SCIENCE 6 WEEK 1

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CHANGES ON THE EARTH'S SURFACE AS A RESULT OF EARTHQUAKES AND VOLCANIC ERUPTIONS

Expectations

This Unified Supplementary Learning Material will help you describe changes on the Earth's surface as a result of earthquakes and volcanic eruptions.

Pre-Test

DIRECTIONS: Encircle the letter of the **best** answer.

1. Which would likely occur after a strong earthquake?
   A. Aftershocks are felt.
   B. Some bridges are slightly damaged.
   C. Small cracks are seen on old buildings.
   D. Buildings and other structures collapsed.
2. Which is **NOT** caused by an earthquake?
   A. Occurrence of tsunami
   B. Formation of new rocks
   C. Incidence of landslides and mudslides
   D. Destruction of old and weak structures
3. What effect of earthquake wipe out structures along and near coastal areas?
   A. landslide B. mudslide C. tidal wave D. tsunami
4. How do volcanoes buildup land?
   A. massive landslides occur
   B. lahar flows and destroys its path
   C. lava flows, hardens and forms new rocks
   D. an eruption destroys the side of the mountain
5. How do volcanic eruptions affect the Earth's surface?
   I. Destroy vegetation
   II. Buildup landforms
   III. Alter the landscape

   A. I only B. II only C. I and II D. I, II and III

Looking Back

DIRECTIONS: Fill in the blanks with the appropriate terms. Choose from the list below.

weathering	***physical weathering***	***soil***	***water***
Earth's surface	***chemical weathering***	***soil erosion***	***wind***

1. The displacement of the upper layer of soil caused by different erosive agents like water is called _____.

2. The process by which rocks in the Earth's surface are broken down into sediments, soil, and other forms is called _____.

3. Weathering and soil erosion shape the _____ and affect the living things and environment.

4. When rock is broken through the force of another substance like water and wind, _____ happens.

5. After many years of continuous weathering, rocks and other materials changed into _____.

Brief Introduction

The surface of the earth is constantly changing. Some changes are results of processes like weathering, soil erosion, and other forces such as earthquakes and volcanic eruptions.

EARTHQUAKE

An earthquake happens when rocks underground suddenly break. This releases energy in waves that travel through the Earth's crust and cause the shaking of the ground.

Effects of Earthquakes. The damages brought by earthquakes depend on the strength of ground shaking and on the preparedness of the people. When strong earthquakes hit a place, the following effects and changes may occur:

- **Great damage to buildings, bridges, roads and other structures**. The ground shaking causes structures to be damaged, like what happened during the July 16,1990 Magnitude 7.7 earthquake which caused many buildings to collapse including the Hyatt Terraces Baguio Hotel. Transportation was also affected because of cracked roads and collapsed bridges.

- **Landslides.** The ground shaking loosens rocks and soil which causes them to slide and bury the area below. These may damage infrastructures and wipe out a large part of mountain or hill. The landslides that happened in Cotabato as a result of series of earthquakes in October 2019 where 5 of the 22 fatalities recorded were attributed to landslides.

- **Mudslides.** These may happen when parts of the mountain hold much water. Rocks, soil and debris move down the side of the mountain or hill together with water. These may flow down and cause mudflow.

- **Liquefaction**. The ground turns into a mud-like form. This happens when a lot of water sitting in loosely packed sediments is shaken because of an earthquake. This will make the foundation of buildings sink and may cause them to lean and collapse. The liquefaction that happened in Davao del Sur where a building sank was caused by a Magnitude 6.9 earthquake on December 15, 2019.

- **Tsunamis.** These are gigantic waves generated by undersea earthquakes. Areas hit by tsunamis are heavily damaged.

VOLCANIC ERUPTIONS

Volcanic eruptions happen when magma and gases are released from the openings of a volcano. Explosive eruptions have the following effects and changes on the earth's surface:

- **Buildup of land around a volcano**. Lava and other materials flow out from the opening of a volcano. These materials eventually cooled, hardened and formed into new rocks which change the landforms around it.

- **Change the landscape and shape of mountain**. This happens when the huge explosion blows the parts of the mountain away and changes its shape. The eruption of Pinatubo Volcano in 1991 reshaped the landscape in the area.

- **Ashfall.** Volcanic ash is a mixture of rocks, minerals and glass particles expelled during a volcanic eruption. The huge amount of ashfall cover houses, properties, vegetation and posed danger to health, like what happened during the eruption of Taal Volcano on January 2020 where ashfall covered villages and more than 40,0000 people evacuated.

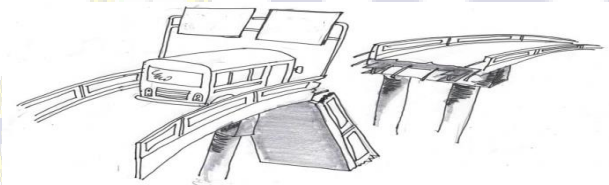
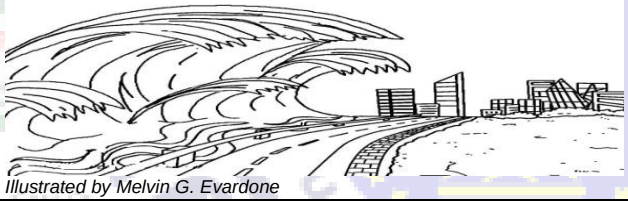
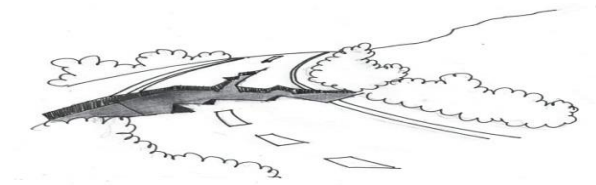
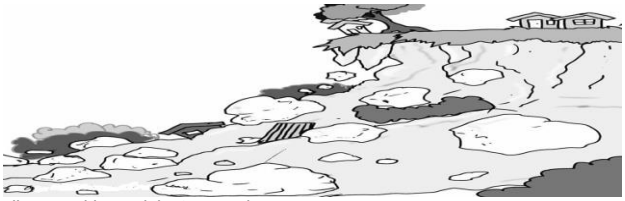
- **Lahar.** It is a violent type of mudflow composed of volcanic materials and water. It carries materials of all sizes, from ash to boulders which are carried to nearby rivers and lakes when heavy rain occurs. This can destroy and bury everything in its path like when Pinatubo Volcano erupted in1991, stream channels were quickly filled with lahars. These also buried buildings, vegetation and destroyed homes of more than 100,000 people.

- **Formation of fertile soil.** Volcanic eruptions release minerals which are weathered and broken down by rain and erosion forming volcanic soils which are capable of high productivity and long-term agricultural benefits.

Activities

Activity 1. Events and Effects

DIRECTIONS: Study the pictures. Identify the event or occurrence each picture shows, and describe the effect/s it will cause on the Earth's surface. Number 1 is done as your guide.

No.	Pictures	Event (earthquake/ landslide/ liquefaction/ tsunami)	Effects on the Earth's surface
1	 *Illustrated by Oliver B Dizon*	earthquake	Damage to bridge, part of it collapsed
2	 *Illustrated by Melvin G. Evardone*		
3	 *Illustrated by Oliver B. Dizon*		
4	 *Illustrated by Melvin G. Evardone*		
5	 *Illustrated by Oliver B. Dizon*		
6	 *Illustrated by Melvin G. Evardone*		

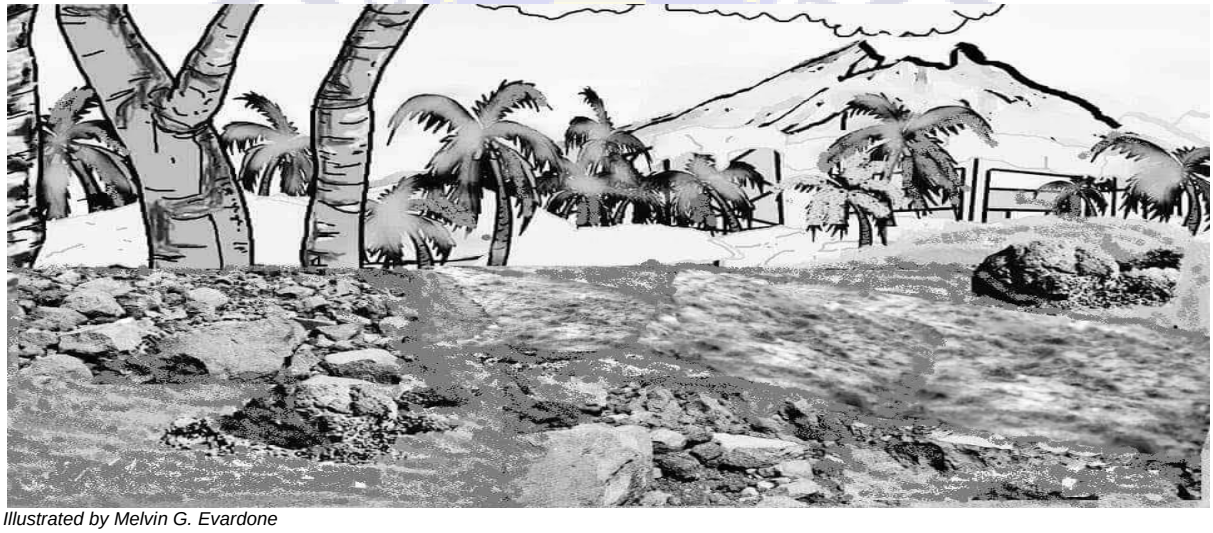
Activity 2. Spot the Difference

DIRECTIONS: Analyze the pictures and identify at least 5 differences. Write your answers on the lines below. Use No.1 as your guide.

Picture A

Illustrated by Melvin G. Evardone

Picture B



Illustrated by Melvin G. Evardone

1. The houses are almost buried in volcanic materials on B.

2. _____

3. _____

4. _____

5. _____

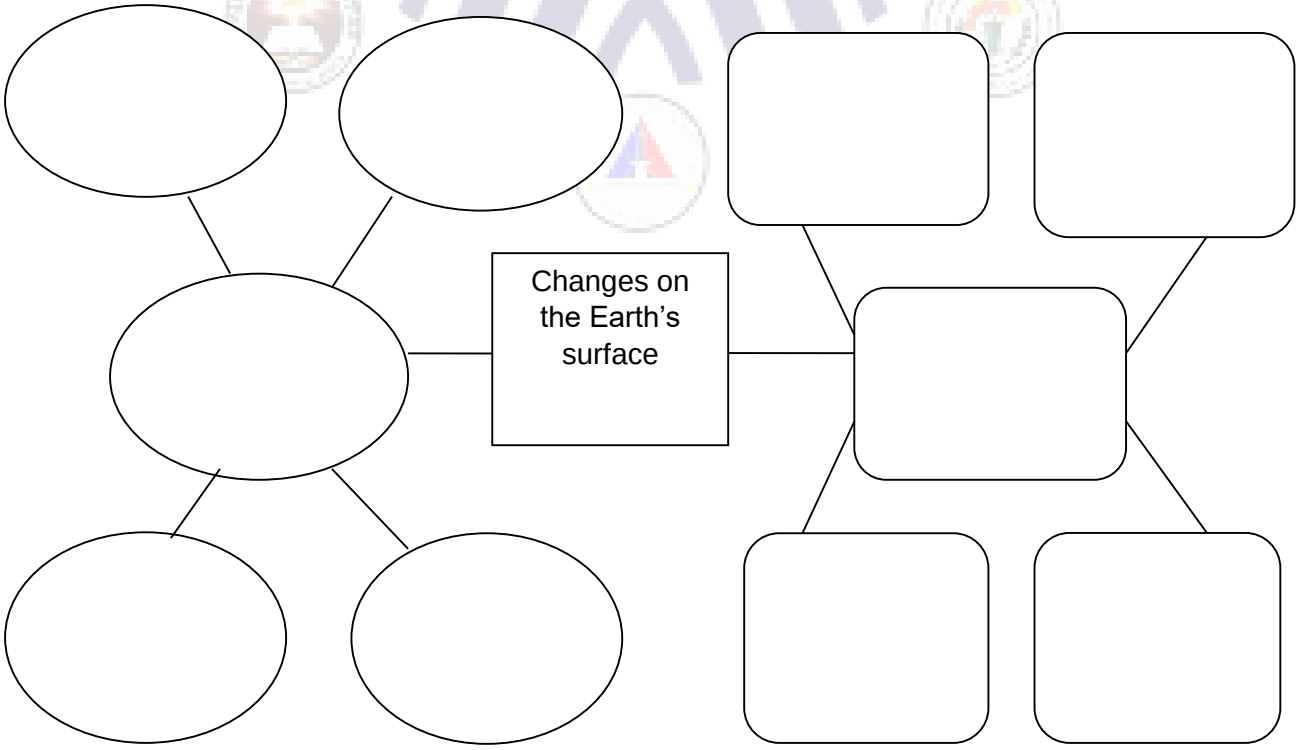
6. _____

Activity 3. Sum Up

DIRECTIONS: Complete the graphic organizer to show the changes on the Earth's surface as a result of earthquakes and volcanic eruptions. Use the ideas from the concept box.

CONCEPT BOX

- Destruction of properties due to lahar flow
- Damage to physical structures due to liquefaction
- Cracks to buildings, bridges, roads and other structure
- Volcanic Eruptions
- Destruction on parts of mountains and hills as results of landslides
- Devastation of coastal and nearby areas due to tsunami
- Earthquakes
- Buildup of land when lava cooled and hardened
- Damage to houses and vegetation due to ashfall
- Change of landscape and shape of mountain due to volcanic materials



Remember

Strong earthquakes change the surface of the Earth especially the physical structures. These include the following:

- Damage to buildings, bridges, roads and other structures
- Destruction of infrastructures and parts of mountains and hills as a result of landslides. Mudslides may happen when part of the mountain holds much water. This flows down and causes mudflow.
- Liquefaction causes foundation of physical structures to sink which results to damage
- Devastation of coastal and nearby areas when tsunamis occur as a result of an undersea earthquake

Explosive volcanic eruptions cause the following changes on the earth's surface:

- Buildup of land around a volcano
- Change of landscape and shape of mountains
- Damage to buildings, houses, properties, physical structures, and vegetation due to volcanic ash or ashfall
- Destruction of properties, vegetation and other structures due to lahar flows
- Formation of fertile soil

Checking Your Understanding

DIRECTIONS: Modified TRUE or FALSE. Write **TRUE** if the statement is correct. If **NOT**, change the underlined word/s to make the statement correct.

_____ 1. The ground shaking <u>hardens</u> rocks and soil.
_____ 2. When water sitting in loosely packed sediments are shaken, <u>liquefaction</u> occurs.
_____ 3. The <u>magma</u> that flows out from the volcano cooled and hardened and cause buildup of land.
_____ 4. <u>Lahar</u> is a violent type of mudflow that destroys structures on its path.
_____ 5. Ashfall during <u>earthquake</u> damages vegetation and houses.

Post-Test

DIRECTIONS: Encircle the letter of the **best** answer.

1. What changes on the Earth's surface are caused by earthquakes?

   I. Liquefaction
   II. Massive landslides
   III. Formation of new rocks

   A. I only B. II only C. I and II D. I, II and III

2. Which would likely occur after a **strong** earthquake?

   A. Low-built houses are partly destroyed.
   B. Several buildings and houses collapsed.
   C. Condemned buildings are further damaged.
   D. Small cracks are formed on weak structures.

3. How does tsunami affect the Earth's surface?

   I. Formation of landforms
   II. Devastation of coastal infrastructures
   III. Destruction of houses, buildings, and plants in the area.

   A. I only B. II only C. II and III D. I, II and III

4. What forms when lava flows out from the volcano cools and hardens?

   A. landscape B. rocks C. soil D. terrain

5. How do materials ejected during volcanic eruptions affect the Earth's surface?

   I. Volcanic ash destroys vegetation.
   II. Lahar flow damages the structures on its path.
   III. The ejected lava hardens and causes buildup of land.

   A. I only B. II only C. I and II D. I, II and III

References

Albor, T. (1991, July 1991). *The Christian Science Monitor. Mt. Pinatubo Remakes Landscape*. Retrieved from csmonitor.com: https://www.csmonitor.com/1991/0710/10031.html

Lacorte, G., & Dinoy, O. (2019, December 21). *Liquefaction Sank Davao del Sur Building*. Retrieved from newsinfo.inquirer.net: https://newsinfo.inquirer.net/1203913/liquefaction-sank-davao-sur-building

Sandiford, M., & Jenkins, R. (2011, February 23). *What causes the ground to liquefy after an earthquake?* Retrieved from ABC Science: https://www.abc.net.au/science/articles/2011/02/23/3146490.htm

DOST-PHIVOLCS. (n.d.). Retrieved from phivolcs.dost.gov.ph: https://www.phivolcs.dost.gov.ph/index.php/earthquake

Answer Key

ACTIVITY 3 - SUM UP

No.	Event	Effects on the Earth's surface
2.	tsunami	Devastation of coastal and nearby areas
3.	liquefaction	Foundation of physical structures sink and may result to damage
4	earthquake	Damage to buildings, may cause them to collapse
5	earthquake	Formation of cracks on roads/ grounds
6	landslides	Destruction on the areas below and wipe parts of the mountain

2. The roofs of houses are covered with volcanic materials on B.
3.Some trees are partly buried and the leaves are covered with volcanic materials on B.
4.The shape of the top of the volcano has changed on B.
5.Rocks and other volcanic materials destroyed the plants on B.
6. Lahar flooded the street and destroyed the plants on B.

PRETEST

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

LOOKING BACK

1. soil erosion
2. weathering
3. Earth's surface
4. physical weathering
5. soil

CHECKING YOUR UNDERSTANDING

1. loosens
2. True
3. lava
4. True
5. volcanic eruption

POSTTEST

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

ACTIVITY 1. EVENTS AND EFFECTS

(Answers may vary)

ACTIVITY 2. SPOT THE DIFFERENCE

(Answers may vary)