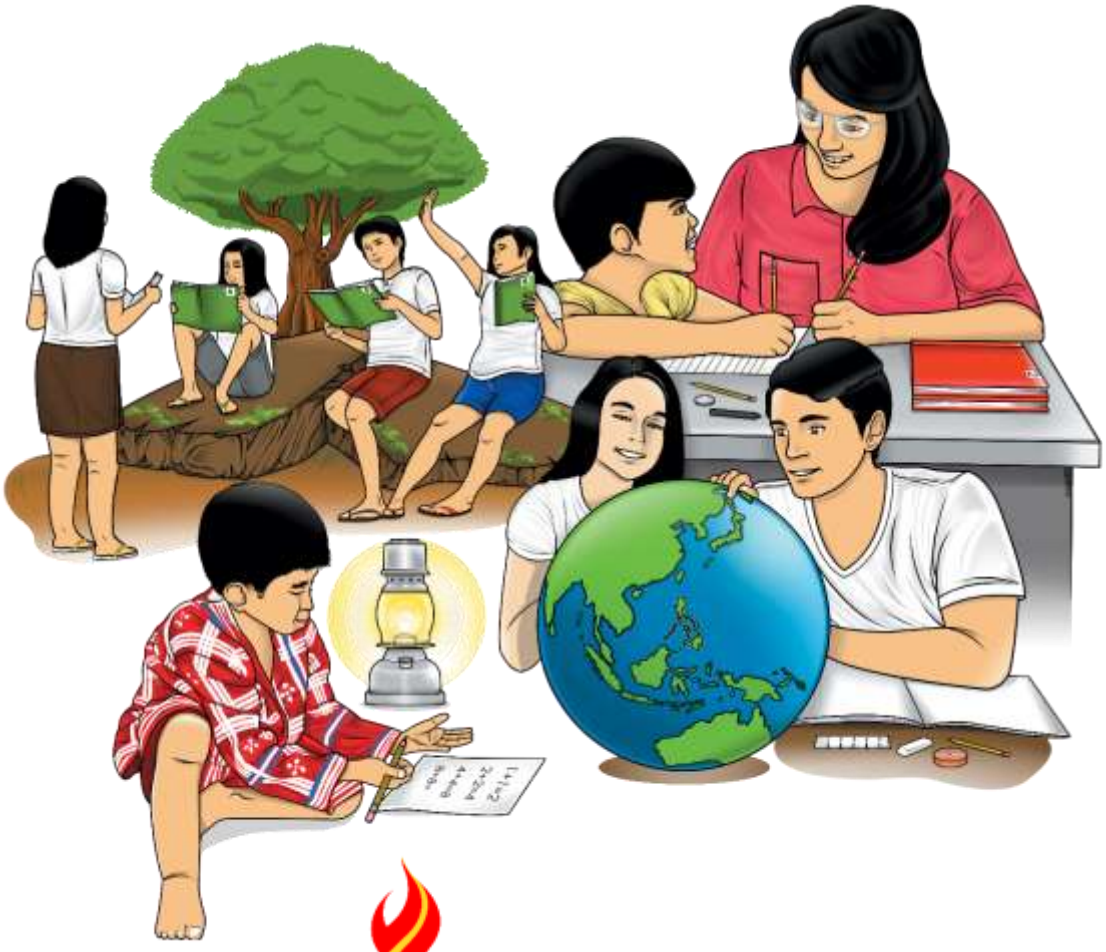
10

DepED
DEPARTMENT OF EDUCATION

Science

Quarter 1 – Module 3: Processes and Landforms Along Plate Boundaries



ALTERNATIVE DELIVERY MODE
ADM

Science – Grade 10
Alternative Delivery Mode
Quarter 1 – Module 3: Processes and Landforms Along Plate Boundaries
First Edition, 2020

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers:	Luzminda F. Agustin	
Editors:	Ma. Maila C. Justo	Emily P. Tandog
Reviewers:	Jaime Campos, Jr.	Jerry R. Junio
	Ma. Criselda G. Ocang	Ellen F. Fernandez
	German J. Ferrer Jr.	Gina A. Amoyen
Illustrator:	Reynaldo C. Poquiz	
Layout Artist:	Reyna H. Talinio	
Management Team:	Tolentino G. Aquino	
	Arlene A. Niro	Carmina C. Gutierrez
	Gina A. Amoyen	Rustico P. Abalos, Jr.
	Editha T. Giron	Marilou D. Roldan

Printed in the Philippines by _____

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

10

Science

Quarter 1 – Module 3: Processes and Landforms Along Plate Boundaries

DepED
DEPARTMENT OF EDUCATION

Introductory Message

For the facilitator:

Welcome to the **Science 10 Alternative Delivery Mode (ADM) Module** on **Processes and Landforms Along Plate Boundaries!**

This module was collaboratively designed, developed, and reviewed by educators both from public and private institutions to assist you, the teacher, or facilitator in helping the learners meet the standards set by the K to 12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

This learning resource hopes to engage the learners in guided and independent learning activities at their own pace and time. Furthermore, this also aims to help learners acquire the needed 21st-century skills while taking into consideration their needs and circumstances.

In addition to the material in the main text, you will also see this box in the body of the module:

Note to the Teacher

This contains helpful tips or strategies that will help you in guiding the learners.

As a facilitator, you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the module.

For the learner:

Welcome to the **Science 10 Alternative Delivery Mode (ADM) Module** on **Processes and Landforms Along Plate Boundaries!**

The hand is one of the most symbolized parts of the human body. It is often used to depict skill, action and purpose. Through our hands, we may learn, create, and accomplish. Hence, the hand in this learning resource signifies that you as a learner is capable and empowered to successfully achieve the relevant competencies and skills at your own pace and time. Your academic success lies in your own hands!

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:

 ***What I Need to Know***	This will give you an idea of the skills or competencies you are expected to learn in the module.
 ***What I Know***	This part includes an activity that aims to check what you already know about the lesson to take. If you get all the answers correct (100%), you may decide to skip this module.
 ***What's In***	This is a brief drill or review to help you link the current lesson with the previous one.
 ***What's New***	In this portion, the new lesson will be introduced to you in various ways such as a story, a song, a poem, a problem opener, an activity, or a situation.
 ***What is It***	This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.
 ***What's More***	This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.
 ***What I Have Learned***	This includes questions or blank sentences/paragraphs to be filled in to process what you learned from the lesson.
 ***What I Can Do***	This section provides an activity that will help you transfer your new knowledge or skill into real-life situations or concerns.
 ***Assessment***	This is a task which aims to evaluate your level of mastery in achieving the learning competency.
 ***Additional Activities***	In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends to the retention of learned concepts.
 ***Answer Key***	This contains answers to all activities in the module.

At the end of this module you will also find:

References	This is a list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and a gain deep understanding of the relevant competencies. You can do it!

What I Need to Know

This learning material includes discussions on the different processes that take place as different plate boundaries are created. The landforms are also mentioned since they are formed at the same time as processes or events happen.

In Lesson 1, we will identify the geological processes, how and why they take place in the different types of convergent plate boundaries which happen between:

- two oceanic plates
- oceanic-continental plates
- two continental plates

In Lesson 2, the different processes taking place at a divergent plate boundary, where and why they take place, and their effects will be discussed.

In Lesson 3, the transform fault boundary, also known as strike-slip boundary, will be discussed with the famous San Andreas Fault as the main example.

There are five activities included in this module. Please perform them with patience, and you will be fascinated with what you will observe and learn.

After going through the activities and discussions in this module, you are expected to be able to:

1. explain the different processes that occur along the plate boundaries; and (S10ES-Ia-j-36.3)
2. name the landforms produced in each type of plate boundary.

What I Know

Before you start in this module, kindly assess your understanding of the lesson by answering the Pretest.

Directions: Choose the letter corresponding to the correct answer. Write your answers on a separate sheet.

1. When magma in the earth's mantle develops a great pressure, the ground above it is pushed upward. If this happens in the middle of an ocean, what landform is produced?
   A. mountain B. volcanic island C. volcano D. continent

2. The tall landform created when two continental plates converge.
   A. mountain range B. volcanic arc C. rift valley D. Oceanic ridge

3. It is a plate that dives down under a less dense plate during subduction.
   A. subducting plate B. continental plate C. mantle D. overriding plate

4. Materials in the mantle flow up and down. Which of the following best describes the mantle?
   A. a solid layer B. partially liquid C. a metallic layer D. very hot layer

5. Which of the following happens when plates diverge or move away from each other?
   A. The crust is destroyed.
   B. New crust is produced because magma rises, then cools off and turns into solid.
   C. Earth's size changes because mountains are added on the earth's surface.
   D. The mantle rises.

6. A rift valley is formed simultaneously with which of the following type of plate boundary?
   A. Convergent plate boundary
   B. Divergent plate boundary
   C. Transform fault plate boundary
   D. Both convergent and divergent plate boundary

7. How do the plates move when we feel that the ground is shaking?
   A. toward each other
   B. away from each other
   C. slide past each other
   D. all of the above

8. It is a landform produced when two continental plates converge.
   A. volcano B. fault C. mountain D. volcanic island

9. Most transform fault boundaries are found in the oceans; a few are on the continents. An example of this type is the San Andreas Fault located in
   A. Marikina, Philippines B. California, USA C. Japan D. Saudi Arabia

10. It is otherwise known as an underwater mountain.
   A. oceanic ridge C. hill
   B. trench D. volcanic island

11. It is a chain of volcanoes developed parallel to a trench or a crack under the ocean.
   A. mountain range C. volcanic island arc
   B. volcanoes D. mountainous

12. It is formed when ocean water flips upward, sometimes up to certain meters high, due to the great push caused by convergence of plates.
   A. wave C. tides
   B. tsunami D. storm

13. It is the point where two plates meet or collide while converging.
   A. collision zone C. subduction zone
   B. sinking point D. meeting point

14. The place where a subducting plate reaches the mantle during convergence.
   A. collision zone C. mantle plume
   B. subduction zone D. magma

15. The word used to refer to the shaking of the ground due to any activity in the lithosphere.
   A. intensity B. earthquake C. Volcanism D. wave

Your answers to the fifteen items must be checked immediately to determine whether you still need to go through the module or not. A score of 15 out of 15 would mean that you can skip the module; 8 to 14 out of 15 items implies that you must proceed.

Lesson 1 Processes and Landforms Along With Convergence of Plates

What's In

You have previously learned that the convection current in the Earth's mantle caused the crust to break into smaller segments. Spaces in between or plate boundaries are created. These plate boundaries are named according to the relative movement of the plates with each other.

Do you still remember these three types of plate boundaries?

Which type of plate boundary is illustrated in each of the following figures below?

A. B) C) 

In A, the arrows point toward each other, so it shows a convergent boundary. With this type of boundary, plates meet or converge. In B, the arrows point away from each other, showing a divergent boundary. Here, the plates separate or move away or diverge. While in C, arrows slide past each other, illustrating a transform fault boundary.

Notes to the Teacher

There are three activities included in lesson 1 which involve comparing densities. A brief review on density formula will help the student understand why oceanic crust is denser than continental crust.

Thank you.

What's New

In your previous lesson, you have learned that the convergence of plates takes place between oceanic and continental plates, two oceanic plates, and two continental plates. Study carefully how each type of convergence produces landforms and geologic processes.

Activity 1: Convergence between an Oceanic Plate and a Continental Plate

Objective:

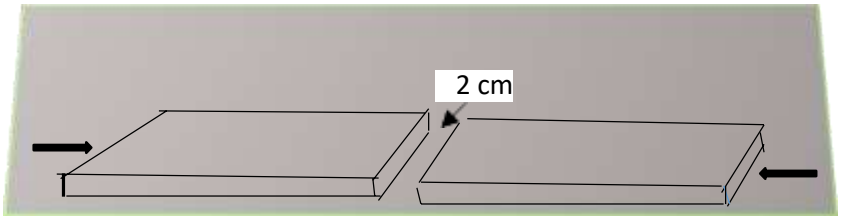
- Explain the processes that occur along a convergent boundary between an oceanic and a continental plate.

Materials:

- half cup of water
- 2 pieces of foam (8 centimeters x 16 centimeters each)
- a flat surface

Procedure:

1. Soak half of the length of one of the foams into the water.
2. Place it on the flat surface at least 2 centimeters away from the other foam, as seen below.



3. Position the soaked part of one of the foams in the middle part of the setup.
4. Slowly push 4 centimeters inward each outer ends of the foams until they overlap.
5. Observe what happens. On a separate answer sheet, draw the final setup and answer the following questions.

Q1. Which foam curves above the other?

Q2. How does the water in the wet foam affect its density?

Q3. If the foams were pieces of the Earth's crust, which one is the continental crust?

Q4. Which foam is the oceanic crust?

Q5. In the activity, what made the wet foam move under dry foam?

Activity 2. Convergence Between Two Oceanic Crusts

Objective:

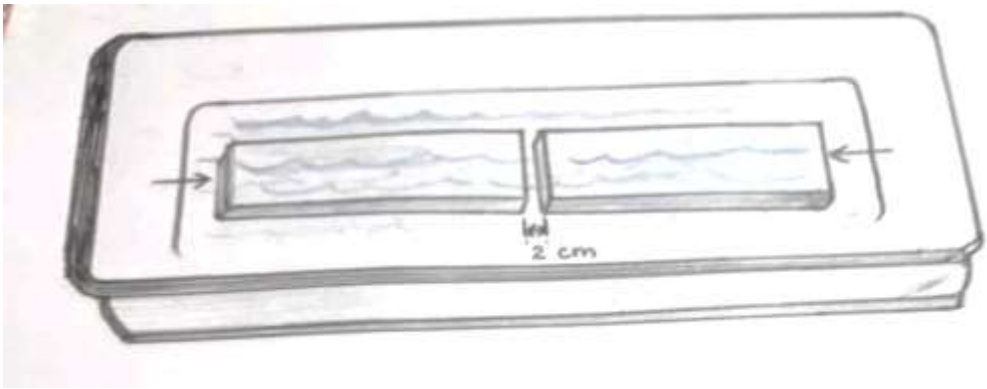
- Explain the processes that occur along a convergent boundary between an oceanic and a continental plate.

Materials:

- rectangular basin or food tray half-filled with water
- 2 pieces of foam (8 cm x 16 cm each)
- a flat surface

Procedure:

1. Submerge the two foams into the basin containing water.
2. Arrange them at least 2 cm away from each other, as seen below.



3. Slowly push 4 centimeters inward each outer end of the foams.
4. Observe what happens. Draw on a separate paper that you see in the setup and write your answers to the questions that follow.

Q6. In the activity, you should have noticed that one foam moved on top of the other while they are converging. If in the process, the top foam suddenly flips up so that some water is pushed forwards and up, what do you see on the water surface, a tsunami, or a ripple?

Q7. If the foams were Earth's plates, then they are oceanic crusts where one subducts under the other. Explain what happens next when there is subduction.

Activity 3: Convergence Between Two Continental Crusts

Objective:

- Explain the processes that occur when two continental crusts converge.

Materials:

- a small soup bowl half-filled with water
- 2 whole pieces of any crunchy cracker or 2 slices of bread
- a flat surface

Procedure:

1. Soak at least 1/3 of the part of the two crackers or bread into the saucer containing water.
2. Arrange them on the flat surface so that their soaked parts touch each other.
3. Push the two crackers or bread slices inward and watch what happens.
4. On another sheet of paper, draw what you see in the setup after step 3 and write your answers to the questions that follow.

Q8. What happened to the colliding parts of the crackers?

Q9. If the crackers were Earth's crusts, what landform was produced?

Q10. What event will the people reside in nearby places experience? Why?

Q11. Do you think volcanic eruption is possible to happen? Why?

What is It

Take note that the arrows in the activity setup are pointing toward each other. As you push both outer ends inward, the dry foam curves upward while the wet foam stays down.

The foams represent an oceanic and a continental crust. They are converging. The continental crust curves upward on top of the oceanic crust due to its lesser density. The oceanic crust, due to its greater density, stays below.

Analyze the figure below. When an oceanic crust converges with a continental crust, a crack between the crusts underwater, called **trench**, is formed. Since the oceanic crust has greater mass due to the presence of water on it, so, its density also is greater. This causes it to dive down or subduct under the overriding plate, the continental plate. **Subduction** is the process by which a plate dives under a less dense plate. At the mantle, the leading edge of the subducting plate melts or becomes fluid. It turns into a hot molten material which we call **magma**.

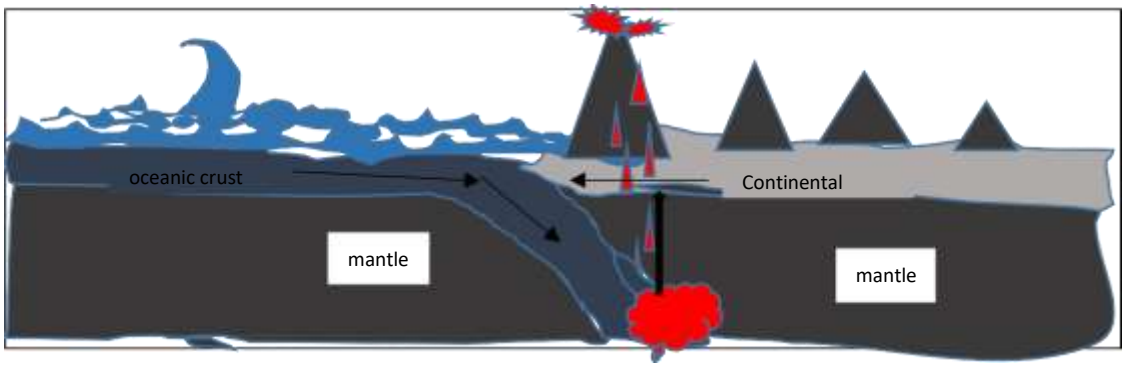


Figure 1. Convergence of oceanic and continental crust

Due to the heat in the mantle, the magma builds up a pressure that enables it to push the ground above it. The column of rising magma is called a **mantle plume**. When there is volcanic activity such as an eruption, the ground moves, and so an **earthquake** is felt. Because subduction continues, a group of volcanoes, called **volcanic arc**, is formed at the surface of the continental crust along the boundary where the two crusts converged.

The movement of the ground may cause a disturbance in the ocean. The water may flip or kick upwards to a few meters high. This is what we call ***tsunamis***, a Japanese term for harbor wave. This event is very dangerous when it moves inland, destroying lives and properties.

The figure below shows two crusts underwater, so they are both oceanic crusts. You must have noticed that there is a boundary line between the crusts, a trench. It is a crack on the crust which is underwater.

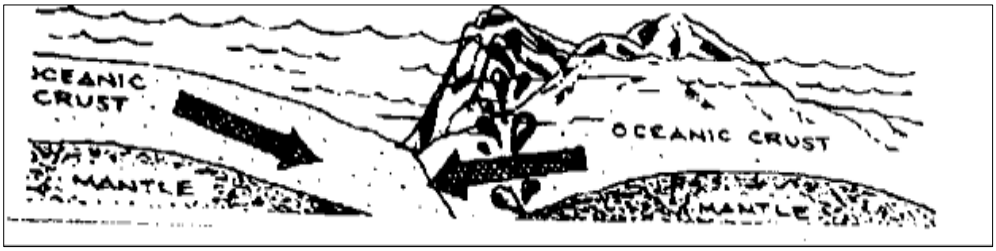
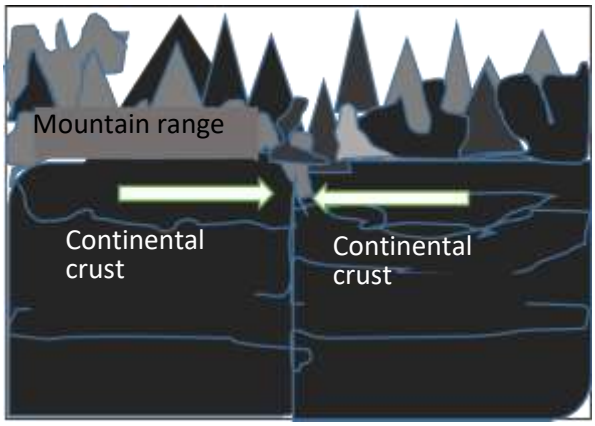


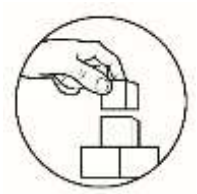
Figure 3. Oceanic Crusts Convergence

The convergence of two oceanic crusts results in some similar events compared to the first type of convergence. **Tsunamis** may be formed. **Earthquakes** may happen. There is also **subduction** because one plate is denser than the other. The front part of the subducting plate becomes magma upon reaching the mantle. Then it builds up pressure due to heat, pushes the crust above it, forming a volcano. This is a continuous process. Since the plates are moving, the volcano will move with the plate. It becomes extinct when it is no longer above the magma deposit in the mantle. A new volcano will then be formed. This series of volcanoes is called **volcanic island arc** since it is surrounded by water.

This explains why the Philippines is mostly loaded with volcanoes. The different islands were believed to have originated from the convergence of two oceanic crusts.

Converging continental crusts or plates result in a **collision zone,** which could cause shallow earthquakes. At that place, a crack called **fault** is formed. This type of convergence will cause **no subduction** since the two plates have the same densities. There would be **no volcanoes formed, no tsunamis**. The convergence will result in a group of high landforms that we call **mountain ranges**.





What's More

Study the map on the right.

Based on the map, answer the following:

1. Plate Y is an oceanic plate. When it converges with the continental Plate X, which of the following will most likely to happen?
   - A. Part of the Plate Y will turn into magma.
   - B. Part of the Plate X will turn into magma.
   - C. Plate Y will vanish and become magma.
   - D. Plate X will become crust above the Nazca Plate.

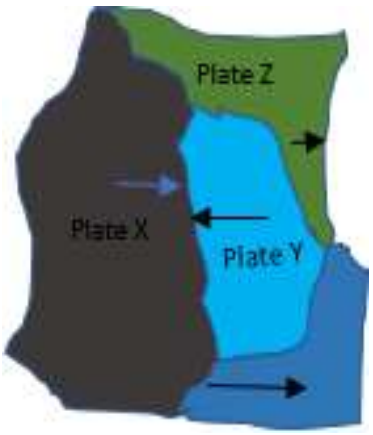


Figure 2. Map of Converging Plates

2. Between Plates Y and X, which one will undergo subduction?
   - A. Plate Y
   - B. both of them
   - C. none of the two
   - D. Plate X

3. What will be formed on the surface of the South American Plate along its convergence zone with Nazca Plate?
   - A. volcanic arc
   - B. fault
   - C. mountain range
   - D. trench

4. What landform is produced during a convergence between two oceanic crusts?
   - A. Mountain
   - B. valley
   - C. volcanic island arc
   - D. mountain range

5. Due to the movement of the plates, what event may be felt by humans in nearby places?
   - A. typhoon
   - B. earthquake
   - C. lightning
   - D. storm

6. If the subducting plate kicks up, it will be displacing some water to a certain height, what other event or process may take place on the water surface?
   - A. tide
   - B. tsunami
   - C. eclipse
   - D. full moon

When two continental crusts converge, both crusts exert a pressure pushing each other. As the ground rises, a tall landform is created.

7. Is it possible to erupt?
8. What process does not take place in this type of convergence?
9. Do the plates in this activity have the same densities?

What I Have Learned

Fill in each blank with the correct word found in the parenthesis.

A) As continental plate converges with an oceanic plate, the (1) _____ (continental, oceanic) plate dives under the (2)_____(continental, oceanic) plate. The process of diving down towards the mantle is called (3)_____(subduction, floatation).

When the leading edge of the subducting plate reaches the mantle, it melts turning into (4)_____(magma, crust) which builds up a pressure making it push the ground above it forming at the surface a (5) _____(volcano, mountain).

At the oceanic plate, a depression called (6)_____(trench, fault) is formed along the boundary. Parallel to it, a series of volcanoes called (7)_____(volcanic island, volcanic island arc) may be formed.

Simultaneous with the convergence, the ground may shake, and so, we experience an earthquake. This shaking may disturb the water surface and may make the water flip upwards to a certain height. This event is called (8)_____(tsunami, wave).

B) When two oceanic plates converge, the denser plate subducts. Once its leading edge reaches the mantle, it melts into a magma, builds up a pressure that makes it push the ground above it, forming a (9)_____(volcanic island, mountain). At the collision zone, a crack called (10)_____(trench, fault) is formed. This depression could be the cause of the shaking of the ground, which is felt like an (11)_____(earthquake, storm). At the water surface, the overriding plate may push a big amount of water causing it to flip upwards forming a (12)_____ (tsunami, wave).

C) The convergence between two continental plates results to a landform called(13)_____(volcanic arc, mountain ranges). Since both plates have the same densities, no plate subducts under the other. There is (14)_____(no volcanic, volcanic) formation. However, since the ground moves, a phenomenon called (15)_____(earthquake, storm) may be felt in nearby places.

Lesson 2

Processes and Landforms Along Divergent Boundary

What's New

With the figure below, analyze the effect of the separation of the lithospheric plates. Identify the landforms created and the processes that take place with this type of boundary.

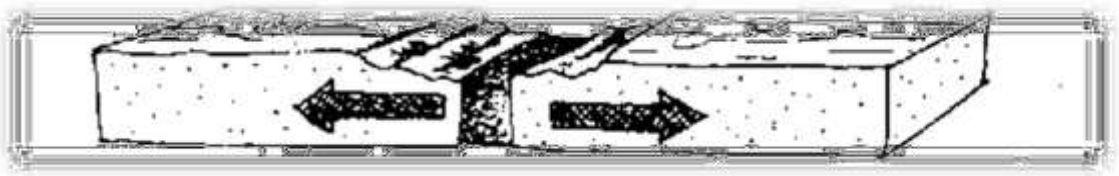


Figure 5: Divergence of Plates

Q1. From the picture, where does divergence of plates usually take place inland or under bodies of water?

Q2. As plates move apart, a tension zone is formed. Which between magma and water, rises to the tension zone?

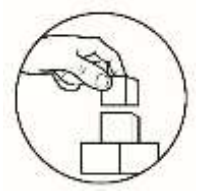
Q3. If the divergence continues, what could probably happen to the size of the space between the splitting crusts? Will it widen or stay the same?

Q4. As the materials at the tension zone reach the surface and cool down, will the materials form a new crust or another layer of the mantle?

What is It

Divergent plate boundaries mostly happen under the oceans. As plates pull away from each other, a vertical space that may extend deep down into the lowest layer of the crust is created. It is a **rift valley**. The force of separation creates a **tension zone**. A shallow earthquake may happen with this plate movement.

Plate divergence is believed to be a slow continuous process. As the plates move away, the gap between them increases. While this happens, materials from the mantle may rise, filling up space. These materials pile up near the tension zone forming mountain-like structures called **oceanic ridges**. But new materials from the mantle may push the old ones. The filled-up space between the plates becomes a new seafloor. This process is known as **seafloor spreading.**



What's More

Have you tried eating a half-cooked egg? As you cut open the white part with your spoon, what comes out of the cooked part? Yes, it is the half-cooked egg yolk. The divergence of plates is somewhat similar to a splitting open egg. As it opens, the half-cooked egg yolk gradually flows out. When it cools down, it becomes solid.

Q5. If the cooked part of the egg is the crust, what material could you compare the half-cooked egg yolk? Why?

Q6. If the half-cooked yolk solidifies when it cools off, what becomes magma when it cools down? Why did you say so?

Q7. The half-cooked egg yolk oozes out only when it is still hot. In the same manner, the magma on the mantle also rises because of high temperature, in the mantle, or the crust?

What I Have Learned

Divergence of plates results to the creation of down faulted valleys called (Q8)_____(rift valleys, oceanic ridges) and underwater mountain ranges called (Q9)_____(rift valleys, oceanic ridges). At the tension zone, materials from the mantle may rise to the surface of the ocean floor, cools down and become new (Q10)_____(crust, mantle).

Lesson 3

Processes and Landforms Along Transform Fault Boundary

What's New

The next type of plate boundary is what everyone fears about these days. It is the transform fault boundary. With this type of boundary, another geologic feature is formed, and events happen.

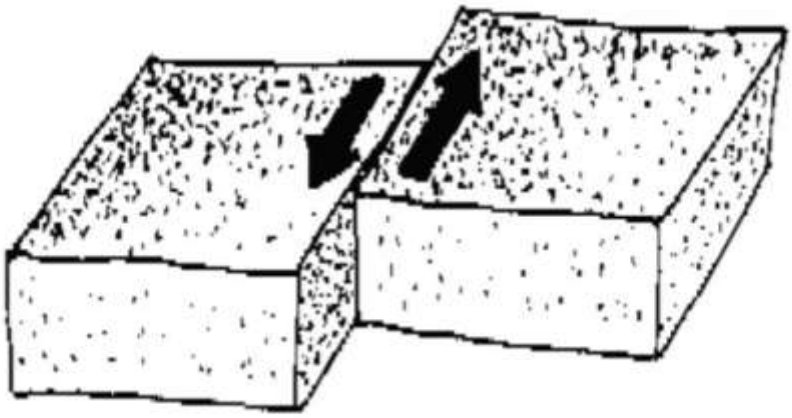


Figure 6: Transform Fault Boundary

Q11. As indicated by the arrows, how do the two plates move relative to each other? Do they move towards each other, away from each other, or sliding past each other?

Q12. Due to this plate movement, what geologic event do you think may happen?

Q13. Since the two plates move, will a fault be formed or a trench, at the tension zone?

What is It

This third type of plate boundary is mostly found in oceans, but there are few that traverse through continental crust.

Figure 8. A Faultline

This is characterized by plates moving horizontally against each other, producing a crack called fault on the ground. The force the plates exert can break the rocks and other materials under the ground. The shaking usually ends abruptly. This is why it brings about strong earthquakes. The fault could swallow humans, cars, and buildings. Murky odorous water from under the ground may spring up from the fault. Most faults do not totally close when the shaking ceases since the adjoining edges have already moved farther from each other.

What's More

Are you aware of the different places along the West Valley Fault? What can you advise a friend who resides in a place traversed by the fault? If you have strong, sturdy furniture inside your house, can you use them to protect yourself from falling objects once the quake strikes? Different places are now designated as evacuation areas where people could seek refuge in case the so-called "BIG ONE" strikes. The "duck, cover, and hold" is practiced in schools among students.

Q14. The word “duck” in “duck, cover, and hold” safety tip means that you must

A. stand straight
B. lie down
C. kneel down on one knee
D. kneel down on both knees

Q15. During earthquakes, it is advisable to cover ones _____

A. head
B. nose
C. mouth
D. face

Q16. Victims of disasters are provided with their needs by the government at

A. evacuation centers
B. event centers
C. orphanages
D. tall buildings

What I Have Learned

When plates slide past each other, the movement can cause an (Q17)_____earthquake, storm). A crack on the ground called (Q18)_____(fault, trench) is formed.

What I Can Do

After discussing the three types of plate boundaries, can you now differentiate them in terms of the events or processes that take place along with them? Let’s see how much have you learned. On a separate paper, which of the geologic process/es namely:

- subduction
- earthquake
- tsunami
- seafloor spreading

take/s place in each of the plate boundaries, and why do they happen? You may use illustrations to help you out with your answers.

Assessment

Direction: Choose the letter of the correct answer:

1. There is no formation of volcanoes in the convergence between.
   A. two oceanic plates
   B. two continental plates
   C. oceanic and continental plates
   D. none of these

2. When a plate is denser, it subducts toward the mantle and forms magma. This process ends up in the formation of _____.
   A. mountain range
   B. trenches
   C. volcanoes
   D. faults

3. Shallow earthquakes are associated with _____.
   A. volcanic eruption
   B. subduction process
   C. a tsunami in the ocean
   D. mountain formation

4. In the convergence between a continental and an oceanic plate, there is subduction. Which of the following statements does not support this fact?
   A. One plate carries water along with it.
   B. One plate is denser.
   C. The temperature in the mantle is higher than in the crust.
   D. One plate overrides the other.

5. Which of the following is formed in the convergence of two oceanic or oceanic and continental plates?
   A. Volcanic island arcs
   B. mountain range
   C. rift valley
   D. Oceanic ridge

6. Of the following, which event or process takes place when two continental plates converge?
   A. earthquake
   B. subduction
   C. tsunami
   D. magma formation

7. A crack on the ground underwater is produced when oceanic crust interacts with another crust. What do we call this?
   A. fault
   B. trench
   C. ridge
   D. crack

8. It is a phenomenon that takes place due to the movement of plates during convergence.
   A. earthquake
   B. magma formation
   C. subduction
   D. tsunami

9. It is the crack on the dry ground or plate caused by horizontal plate movement.
   A. fault
   B. trench
   C. valley
   D. ridge

10. An event that may take place on the water surface when a great force pushes a significant amount of water upwards.
    A. ocean wave
    B. typhoon
    C. tsunami
    D. ocean tide

11. Subduction is illustrated in which of the following?
    A. convergent plate boundary
    B. transform fault boundary
    C. divergent plate boundary
    D. subducting plates

12. Which of the following correctly illustrates seafloor spreading?

A. 

C. 

B. 

D. 

13. Earthquake, as an effect of plate movement, results in boundaries where plates are
    a. converging b. sliding past c. diverging d. subducting
    A. a only B. b only C. a and b D. a, b, and c

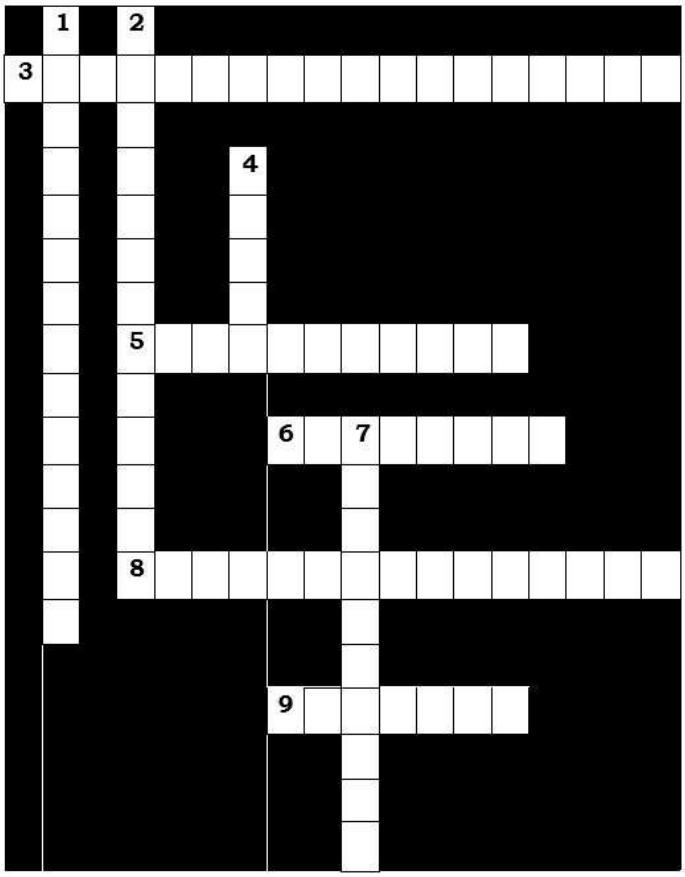
14. Most of the Philippine Islands were once part of island arcs. This means that along with this boundary, there once existed two _____.
    A. converging continental plates
    B. diverging plates
    C. converging oceanic plates
    D. plates sliding past each other

15. Why are volcanoes mostly found at places where continents meet the seas?
    A. It is where water meets land.
    B. It is where the oceanic plates subduct under the continental plate.
    C. Underneath it is a subduction zone.
    D. More magma is produced under the ground because of the muddy seafloor.

Additional Activities

Complete the **crossword** by filling in a word that fits each **clue**. Refer to the given clues on the next page.

Crossword



Across:

3 Land formation produced by the convergence of two oceanic plates

5 A valley formed when two oceanic plates diverged with each other.

6 A crack between converging oceanic crusts.

8 A process by which the leading edge of an oceanic crust submerged into the mantle.

9 A huge displacement of ocean water caused by plate movement.

Down:

1 Landform created by two converging continental plates.

2 Underwater mountain ranges.

4 A crack on a dry ground

7 The vibration of the Earth's Lithosphere.

Answer Key

Lesson 2

What's New
Q1. under bodies of water
Q2. magma
Q3. Widen
Q4. new crust

What's More
Q5. Magma. It flows.
Q6.new crust. It is on the top layer of the Earth.
Q7. Mantle

What I Have Learned
Q8. rift valleys
Q9. Oceanic ridges
Q10. Crust

Lesson 3

What's New
Q11. Sliding past
Q12. earthquake
Q13. Fault

What's More
Q14. C
Q15. A
Q16. A

What I Have Learned
Q17. Earthquake
Q18. Fault

What I Can Do

1. Convergent Plate Boundary
- Subduction
This happens when plate movement takes place under water. Plate density increases with water.
- Earthquake
Strong earthquake may happen when it is caused by volcanic eruption along a subduction zone; when convergence takes place within the continent, a shallow earthquake usually occurs.
- Tsunami
This takes place when plate movement is underwater.

Divergent Plate Boundary
- Earthquake
Shallow earthquake may happen due to plates movement.
- Seafloor spreading
Materials from the mantle fill up the gap left by the separating plates. But new ones may push the old materials sideways thereby widening the gap which become a new seafloor.

2. Transform Fault Boundary
- Earthquake
Strong earthquake may happen due to the sudden stop of plates movement.

What I Know

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

Lesson 1

What's New
Q1. Dry foam
Q2. increases its density due to increased mass
Q3.dry foam
Q4. Wet foam
Q5. Greater density
Q6. tsunami
Q7. Magma will be formed in the mantle and volcanoes will emerge in the ocean
Q8. they piled up and gather
Q9. Earthquake
Q10. Earthquake; because the ground moves
Q11. No. No subduction, no volcano

What's More
1. A
2. A
3. A
4. C
5. B
6. B
7. No
8. Yes
9. Subduction

What I Have Learned
1.oceanic
2.continental
3.subduction
4.magma
5.volcano
6.trench
7.volcanic island arc
8.tsunami
9.volcanic island
10.trench
11.earthquake
12.tsunami
13.mountain ranges
14.no volcanic
15.earthquake

References

Printed Materials

Department of Education-Instructional Materials Council Secretariat (DepEd-IMCS) (2015) Science-Grade 10 Learner's Material. Rex Book Store, Inc.

Department of Education-Instructional Materials Council Secretariat (DepEd-IMCS) (2015) Science-Grade 10 Teacher's Guide. Rex Book Store, Inc.

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 * blr.lrpd@deped.gov.ph