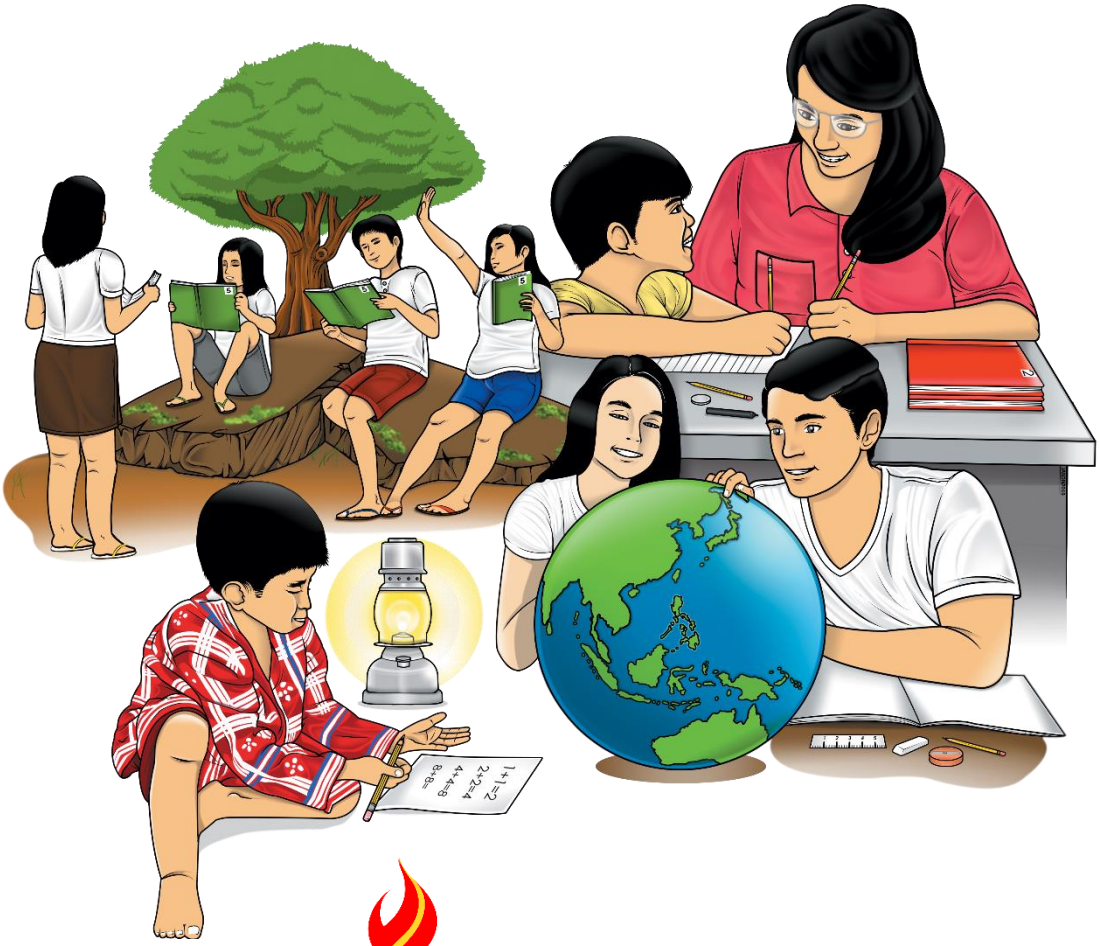
10

Science

Quarter 1 – Module 5:week 5
Processes and Landforms along Plate Boundaries



ALTERNATIVE DELIVERY MODE

Department of Education • Republic of the Philippines

Science – Grade 10
Alternative Delivery Mode
Quarter 1 – Module 1: Processes and Landforms along Plate Boundaries
First Edition, 2019

Published by the Department of Education
Secretary:
Undersecretary:
Assistant Secretary:

Development Team of the Module

Authors:

Editor:

Reviewers:

Illustrator:

Layout Artist:

Management Team:

Printed in the Philippines by _____

Department of Education – Bureau of Learning Resources (DepEd-BLR) **(Sample)**

Office Address: _____
_____
Telefax: _____
E-mail Address: _____

10

Science

Quarter 1 – Module 1: Processes and Landforms along Plate Boundaries

This instructional material was collaboratively developed and reviewed by educators from public and private schools, colleges, and or/universities. We encourage teachers and other education stakeholders to email their feedback, comments, and recommendations to the Department of Education at action@deped.gov.ph.

We value your feedback and recommendations.

Department of Education • Republic of the Philippines

Introductory Message

For the facilitator:

(This gives an instruction to the facilitator to orient the learners and support the parents, elder sibling etc. of the learners on how to use the module. Furthermore, this also instructs the facilitator to remind the learners to use separate sheets in answering the pre-test, self-check exercises, and post-test.)

For the learner:

(This communicates directly to the learners and hence, must be interactive. This contains instructions on how to use the module. The structure and the procedure of working through the module are explained here. This also gives an overview of the content of the module. If standard symbols are used to represent some parts of the module such as the objectives, input, practice task and the like they are defined and explained in this portion.)

What I Need to Know

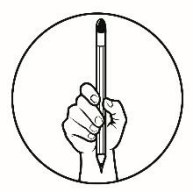
This module was designed and written with you in mind. It is here to help you master the processes and landforms along plate boundaries. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is divided into three lessons, namely:

- Lesson 1 –
- Lesson 2 –
- Lesson 3 – Processes and Landforms along Plate Boundaries
  S10ES –Iaj-36.3

After going through this module, you are expected to:

1. 3.10. Explain the processes that occur along transform fault boundaries
   S10ES –Iaj-36.3.10
2. 3.11. Identify the landforms associated with transform plate boundaries
   S10ES –Iaj-36.3.11



What I Know

Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. Transform fault boundaries were postulated by
    a. Alfred Wegener
    b. Harry Hess
    c. John Tuzo Wilson
    d. Charles Robert Darwin

2. Which plates slide or grind past each other without moving away or moving toward each other?
    a. convergent plate boundary
    b. divergent plate boundary
    c. transform fault boundary
    d. plate tectonics

3. The instant concerns about transform fault boundaries which are triggered by movements along the fault system is
    a. earthquake activities
    b. formation of mountains
    c. formation of springs
    d. formation of streams

4. The most famous example of transform fault boundary that cuts continental lithosphere is
    a. Alpine Fault of New Zealand
    b. San Andreas Fault
    c. Queen Charlotte Fault
    d. Dead Sea Fault

5. All plate boundaries can create their own unique fault type, which plate boundaries that can only moves horizontally?
    a. transform fault boundary
    b. divergent plate boundary
    c. convergent plate boundary
    d. plate tectonics

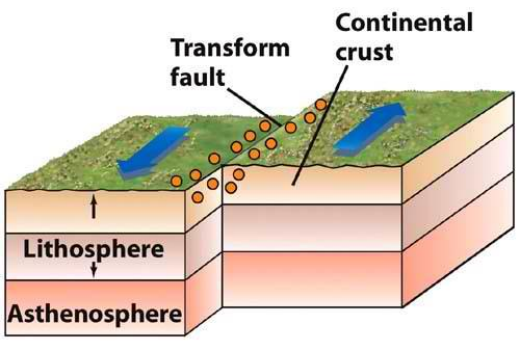
Lesson 3 Processes and Landforms along Plate Boundaries

Plate boundaries are made up of the solid part of the Earth known as the **lithospheres** were humankind and all other living organisms live. This solid portion of the Earth is divided into 12 large tectonic plates that fit together when connected similar to a puzzle. The places where the 12 major plates meet together are called plate boundaries. There are three major types of plate boundaries according to its motion; Convergent, Divergent and Transform Fault boundaries. A **convergent** plate boundary is where the plates move toward each other and when the movement of the plates is away from each other, then it is known as **divergent** plate boundary. The motion of the **transform** fault boundaries is sliding past each other horizontally in parallel but opposite directions. This different movement of the plates creates diverse geologic events to arise.

What's In

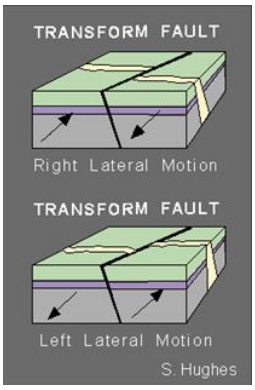
Transform Fault Boundary

Transform Fault Boundaries is the third type of plate boundaries in which the plates slide past with each other horizontally as shown in the figure 1 below. The fracture region that makes up a transform plate boundary is known as the transform fault. It was first suggested by John Tuzo Wilson, a Canadian geophysicist, in 1965. In transform fault boundaries the movement of the plates is horizontal or side to side in direction. As the two plates slide past with each other, it does not create nor destroy a land, that's why geologist considered this plate as conservative. The direction of the plate's movement can be dextral when it occurs to the right of the fault or sinistral when it occurs to the fault's left, as shown in figure 2. These lithospheric movements produce different geological features.



https://www.assignmentpoint.com/wp-content/uploads/2016/07/Transform-Plates.jpg

Figure 1. Transform Plate Boundary



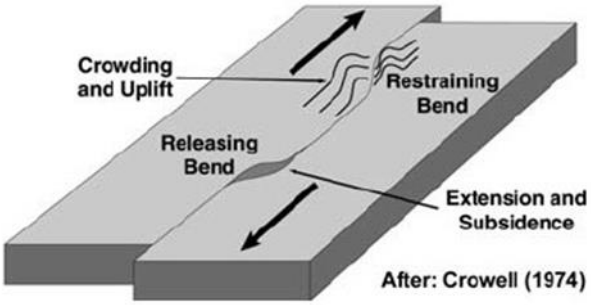
https://ph.images.search.yahoo.com/yhs/search

Figure 2. Dextral and Sinistral

What's New

Transform Fault Boundaries Geological Features

Transform boundaries are usually located along divergent plate boundaries and frequently occur on the seafloor, where they form oceanic fracture zones. It produces fault when it happen on land. Like convergent and divergent plate boundaries, the movement of the crust along transform boundaries produces earthquakes. Mountains, basins and other extra ordinary topographical features can also be formed. In the figure below, it illustrates that tall mountains can be form in restraining bends as a result of compression and in releasing bend normal faults could be form and basins as it pull-apart.



https://scienceterms.net/geology/transform-boundary/
Figure 3. Formations of Basins and Mountains

Transform Boundaries Landforms

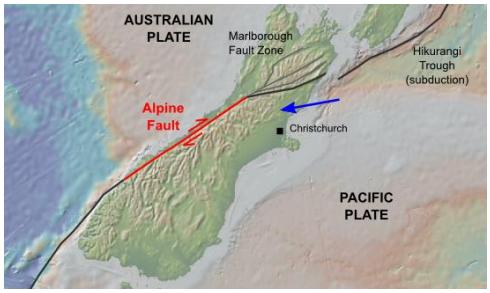
San Andreas Fault

A minimal number of transform faults part continental lithosphere. The most popular sample of this is the San Andreas Fault Zone of western North America. The San Andreas connects a divergent boundary in the Gulf of California with the Cascadia subduction zone as illustrated in figure number 4. San Andreas violently shook San Francisco city in 1906 with the magnitude of 7.9. This earthquake created fires that burned multiple buildings in San Francisco and claims hundreds to thousands people's lives.

Figure 4. San Andreas Fault

Alpine Fault

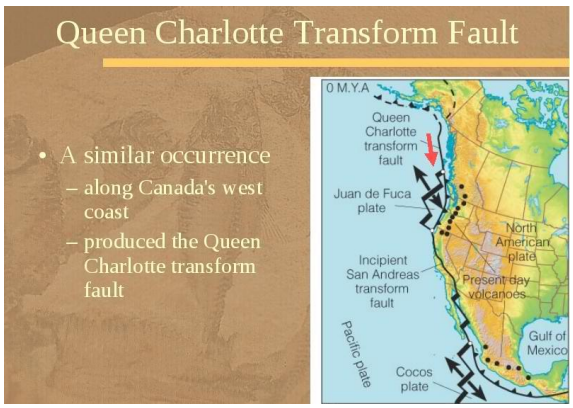
The Alpine Fault is a geological fault, known as a right-lateral-strike-slip fault. It forms a transform boundary between the Pacific Plate and the Indo-Australian Plate as shown in figure 5. It runs about 600km up the spine of the South Island and is one of the world's major geological features. It's the "on-land" boundary of the Pacific and Australian Plates. This fault ruptured four times in the past 900 years producing an earthquake of about magnitude 8. According to the journal published in New Zealand; there is always the potential for a large earthquake on this fault, as there is for any other fault in New Zealand.



http://all-geo.org/highlyallochthonous/wp-content/uploads/2010/09/AlpineFault.png
Figure 6. The Alpine Fault

Queen Charlotte Fault

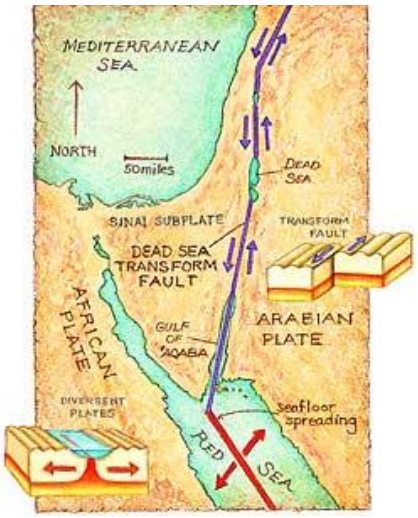
The Queen Charlotte Fault is an active transform fault that marks the boundary of the North American and the Pacific Plates as shown in figure 6. It is the northern equivalent to the San Andreas Fault. The fault is located in Queen Charlotte's Island in Canada (now Haida Gwaii). In August 22, 1949 the largest Earthquake with a magnitude of 8.1 shook the Queen Charlotte Island.



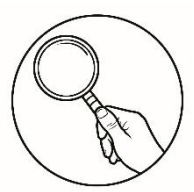
http://fayllar.org/oligocene-brule-formation/img137.jpg
Figure 6. Queen Charlotte Transform Fault

Dead Sea Rift

The Dead Sea Fault is an active transform fault forming the boundary between the African and Arabian plates as seen in figure 7 and sometimes this fault known as the Dead Sea Rift. In 1927, a magnitude of 6.0 earthquakes occurred exactly north of the Dead Sea and resulted in significant damage in many cities including Jerusalem. About 300 people were died during the Earthquake.



https://naturalishistoria.files.wordpress.com/2014/09/dead-sea-transform-fault.jpg
Figure 7. Dead Sea Transform Fault



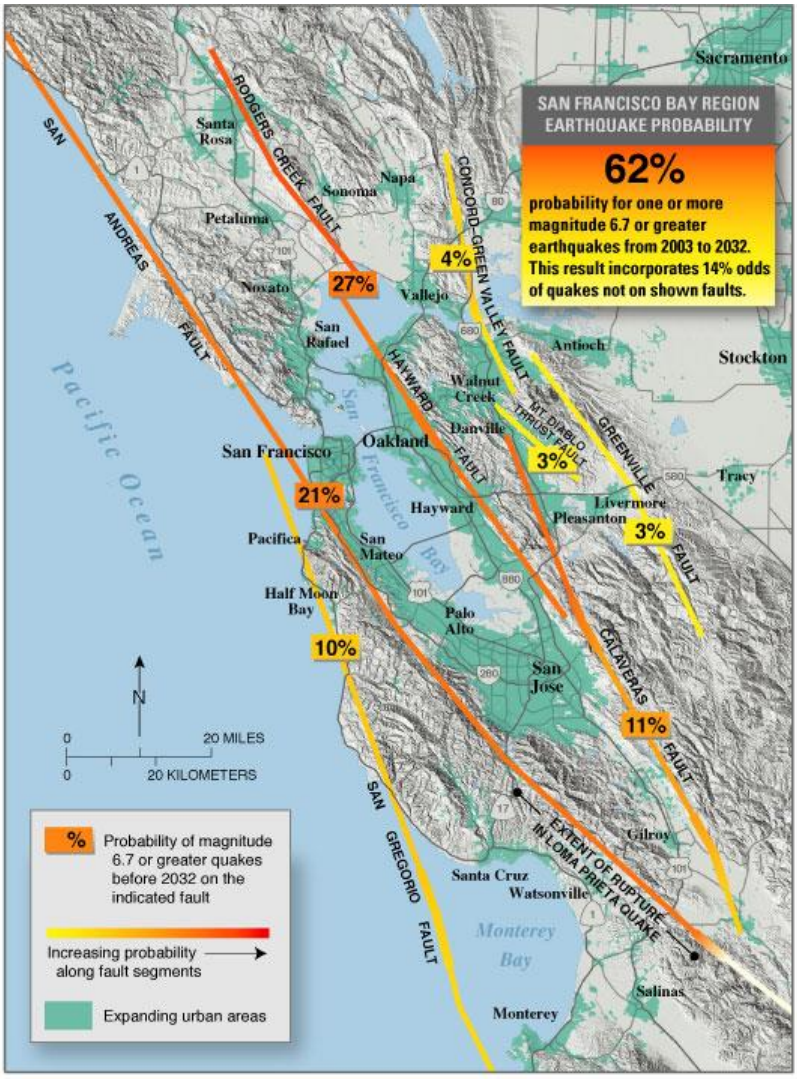
What is It

Activity 1.1. Fault Finders

Directions: Using the Map below arrange the following faults from the highest percentage probability of magnitude 6.7 or greater earthquakes to occur before 2032.

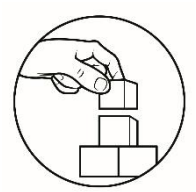
San Gregorio Fault	Calaveras Fault	Roogers Creek Fault
San Andreas Fault	Concord-Green Valley Fault	

1. _____
2. _____
3. _____
4. _____
5. _____



https://upload.wikimedia.org/wikipedia/commons/9/9b/Eq-prob.jpg

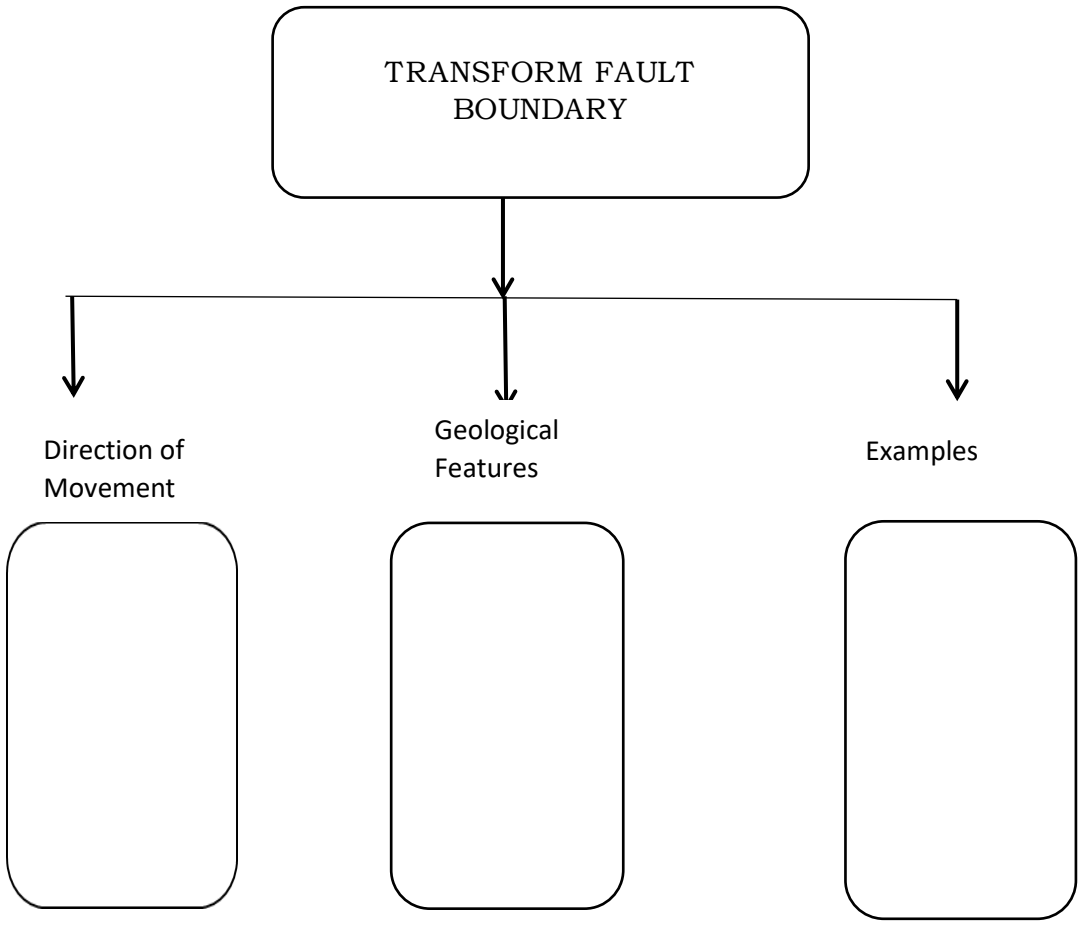
Figure 8. San Francisco Bay Region Earthquake Probability.



What's More

Activity 1.2. Be a Transform Fault

Directions: Apply your understanding about the Transform Fault Boundary by supplying the information needed inside the graphic organizer.



What I Have Learned

1. The movement of the transform fault boundaries is sliding past each other horizontally in parallel but opposite directions.
2. The direction of the movement of the transform fault boundary can be dextral or sinistral.
3. John Tuzo Wilson is a Canadian geophysicist who first suggested the transform fault boundary in 1965.
4. Transform fault boundaries are common along divergent plate boundaries where they connect sections of oceanic spreading centers or mid-ocean ridges.
5. The movement of the crust along transform fault boundaries produces earthquakes, mountains, springs, fault valleys, offset streams, normal faults and pull-apart basins.
6. The most famous sample of the transform fault is the San Andreas Fault Zone of western North America.
7. The Alpine Fault is a transform boundary between the Pacific Plate and the Indo-Australian Plate
8. The Queen Charlotte Fault is an active transform fault that marks the boundary of the North American and the Pacific Plates and known as the “North San Andreas Fault”.
9. The Dead Sea Fault is an active transform fault forming the boundary between the African and Arabian plates.
10. In transform fault boundaries the lithosphere is neither created nor destroyed, hence it is considered as “conservative” plate boundaries.

What I Can Do

Activity 1.3. Stop, Look and Listen

Directions: below is the link of the videos showing the demonstration of the transform fault boundaries. Stop writing or browsing, look on how the transform faults boundaries occur as demonstrated from the video and listen to the explanations. Answer the questions below after viewing.

https://www.youtube.com/watch?v=gcz7DnE34Tg

1. Lists all the materials used in the demonstration of the transform fault boundary.

   _____
   _____
   _____
   _____.

2. Write all your observations.

   _____
   _____
   _____
   _____.

3. Conclusions/Summary

   _____
   _____
   _____
   _____.

Assessment

Multiple Choice. Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. Which of the following facts describes a transform fault boundaries?
    a. produced when two plates slide past each other
    b. produced when the two plates are moving apart each other
    c. produced when the two plates move toward each other
    d. produced when the two plates collide with each other

2. Which of the following active faults is NOT an example of a transform fault boundary?
    a. San Andreas Fault
    b. Alpine Fault in New Zealand
    c. Queen Charlotte Island
    d. Mid-Atlantic Ridge

3. In what particular places where you can find transform faults boundaries?
    a. Only along Mid-Ocean Ridge
    b. Only at the edge of the plates
    c. Only in the center of the plates
    d. Both along the Mid-Ocean Ridge and at the edge of the plates

4. Which of the following geological features is NOT associated with the transform faults?
    a. earthquakes
    b. mountains ranges
    c. fault valleys
    d. hot springs

5. Which statement below describes the Queen Charlotte Island?
    a. forming the boundary between the African and Arabian plates
    b. forming the boundary between the Pacific Plate and the Indo-Australian Plate
    c. forming the boundary between the North American and the Pacific Plates
    d. forming the boundary between divergent boundary in the Gulf of California with the Cascadia subduction zone.

Additional Activities

Activity 1.4. Transform the Transform Fault Boundary

Direction: draw the movement of the transform fault boundary inside the box. Use your creativity in transforming the transform fault boundary into a drawing.

The Transform Fault Boundary

Answer Key

What I Know	What's More	Assessment
1. C 2. C 3. A 4. B 5. A	1. Sliding past each other 2. Earthquakes,faults, mountains, hot spring and etc… 3. San Andreas Fault, Alpine Fault, Queen Charlotte Island, Dead Sea fault	1. A 2. D 3. D 4. B 5. C

References

1. https://classconnection.s3.amazonaws.com/751/flashcards/1799751/jpg/san-andreas-fault-map1351101888097.jpg
2. https://scienceterms.net/geology/transform-boundary/
3. https://sciencetrends.com/transform-boundary-definition-and-examples/#what-is-a-transform-boundary
4. https://link.springer.com/article/10.1007/s00367-013-0333-3
5. https://scienceterms.net/geology/transform-boundary/
6. https://scienceterms.net/geology/plate-boundaries/
7. https://geology.com/nsta/transform-plate-boundaries.shtml
8. https://ph.images.search.yahoo.com/yhs/search;_ylt=AwrxhWqk1rZeiHAACQTfSQx.;_ylu=X3oDMTB0N2poMXRwBGNvbG8Dc2czBHBvcwMxBHZ0aWQDBHNlYwNwaXZz?p=geol

For inquiries or feedback, please write or call:

Department of Education – (Bureau/Office)

(Office Address)

Telefax:

Email Address: