Senior High School

Department of Education
National Capital Region
SCHOOLS DIVISION OFFICE
MARIKINA CITY

Earth & Life Science

First Quarter-Module 7

Folds and Faults

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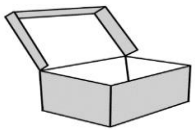


What I Need to Know

This module was designed and written with you in mind. It is here to help you understand how the movement of plates lead to the formation of folds and faults. 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.

The module has one lesson which is folds and faults.

At the end of the module, you are expected to

1. describe and illustrate plate movement;
2. enumerate and describe the kinds of stress caused by plate movement;
3. illustrate each kind of stress;
4. describe and illustrate folds and faults; and
5. **explain how the movement of plates lead to the formation of folds and faults (S11/12ES-Id-22).**

What I Know

Read each question carefully and encircle the letter of the correct answer.

1. Which of the following is **TRUE** about compressional stress?

   I. Compression happens at transform boundaries.
   II. When rocks are compressed, they are squeezed.
   III. When rocks undergo compression, they are pulled apart.
   IV. Compression happens when rocks are pushed toward each other.

   A. I and II
   B. II and IV
   C. I and III
   D. II and III

2. Which type of stress result to the formation of folds and faults?

   A. Shear stress
   B. Tensional stress
   C. A and B
   D. Compressional stress

3. When does a fold form?

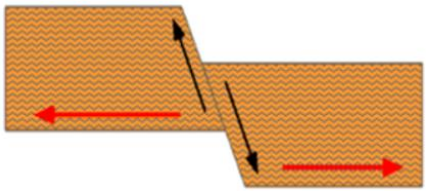
   A. During plate collision
   B. When plates spread apart
   C. When plates slide past one another
   D. When compression stress overcomes the internal strength of rock

4. How do anticline and syncline fold differ?
   A. Anticline is thinner than syncline.
   B. Anticline is thicker than syncline.
   C. Anticline is downfold while syncline is upfold of rock layers.
   D. Anticline is upfold while syncline is downfold of rock layers.

5. When does a fault form?
   A. When plates spread apart
   B. When plates slide past one another
   C. When compression stress overcomes the internal strength of rock
   D. When the rocks' internal strength is greater than the compression stress

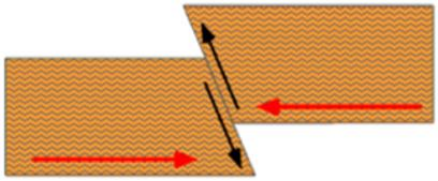
6. Which of the following is TRUE about normal faults?
   I. One slab is displaced up, and the other down
   II. The direction of the plates' movement is opposite each other.
   III. The direction of the plates' movement is parallel to each other.
   IV. It happens when the block of rock is pushed over the other block.
   A. I and II
   B. III and IV
   C. I and III
   D. II and IV

7. See the picture below. What kind of fault is shown?



   A. Normal
   B. Reverse
   C. Anticline
   D. Syncline

8. See the picture below. what kind of fault is shown?



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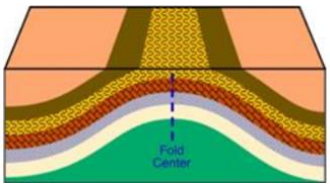

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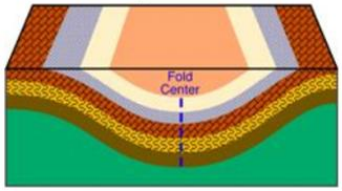


   A. Normal
   B. Reverse
   C. Anticline
   D. Syncline

11. Which of the following refers to the technical term for pressure applied to rocks?
    A. Deformation
    B. Fold
    C. Stress
    D. Strain

12. Which type of deformation results in faults?
    A. Brittle
    B. Ductile
    C. Elastic
    D. Plastic

13. When the stress is released, rocks go back to their original shape. What type of deformation is this called?
    A. Brittle
    B. Ductile
    C. Elastic
    D. Plastic

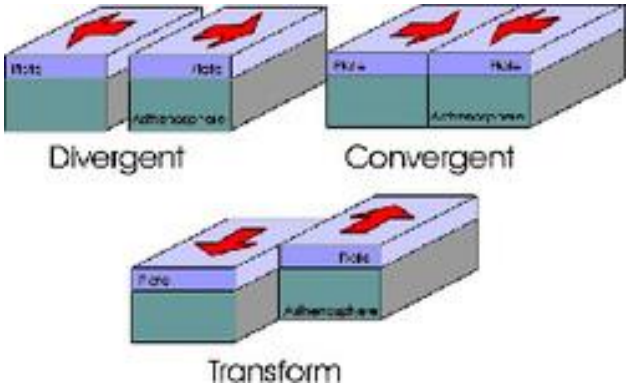
14. Which is **TRUE** regarding plate movement?
    I. Plate movement can cause different kinds of stress.
    II. Plate movement cause the formation of folds and faults.
    III. Tension and shear stress cause the formation of folds and faults.
    IV. Rocks that are undergoing deformation are not experiencing strain.
    A. I and II
    B. III and IV
    C. I and III
    D. II and IV

15. Which of the following is **TRUE** about the different stress experienced by rocks?
    I. Shear happens at transform plate boundaries.
    II. Tension happens at convergent plate boundaries
    III. Compression happens at divergent plate boundaries.
    IV. Plate movement results can cause different kinds of stress.
    A. I and II
    B. II and III
    C. I and IV
    D. II and IV

Lesson 1 Folds and Faults

What's In

Plate movements is due to the heat within the Earth's interior. It may be toward each other, away from each other or slide across each other. These plate movements are known as **convergent**, **divergent** and **transform**. The formation of mountains and continents were the major effect of these plate movements.

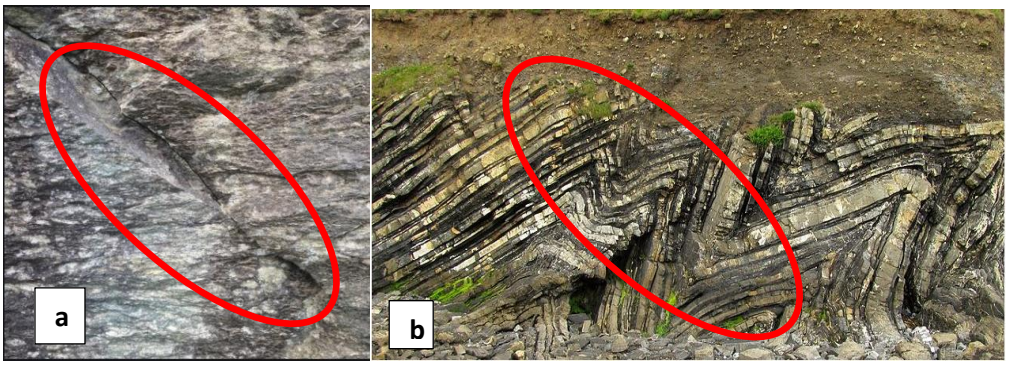


Source: http://gamediv1.weebly.com/tectonic-plate-movement.html

What's New

Activity 1.2.

Study the picture below and answer the questions that follows.



Source: *From left to right*
(1) Rock. Snappygoat. Accessed September 2, 2020. https://snappygoat.com/s/?q=rock

1. Do plate movements responsible for these rock deformations? Why?

2. What do we call these deformations in picture a? How about in b?

What Is It

You would recall from your previous lessons that plates are continuously moving. The movement of plates towards or away from each other causes displacement of rocks or crustal deformation when strong forces are applied. This causes rocks to experience stress.

All of these different types of stresses will eventually lead to changes in the shape or form of a rock, a process known as deformation – de"forming". Rocks that are undergoing deformation are experiencing strain. There are several examples of deformation: brittle deformation, ductile or plastic deformation and elastic deformation. In brittle deformation, strain results in breaking the rock. In ductile or plastic deformation, the rock bends, or folds. In elastic deformation, the deformation is not permanent. When the stress is released, rocks go back to their original shape.

Plate movement can cause different kinds of stress. There are tensional stress, compressional stress, and shear stress. While plate movement can cause crustal deformation, it may result in the formation of folds and faults. Folds and faults result due to compressional stress.

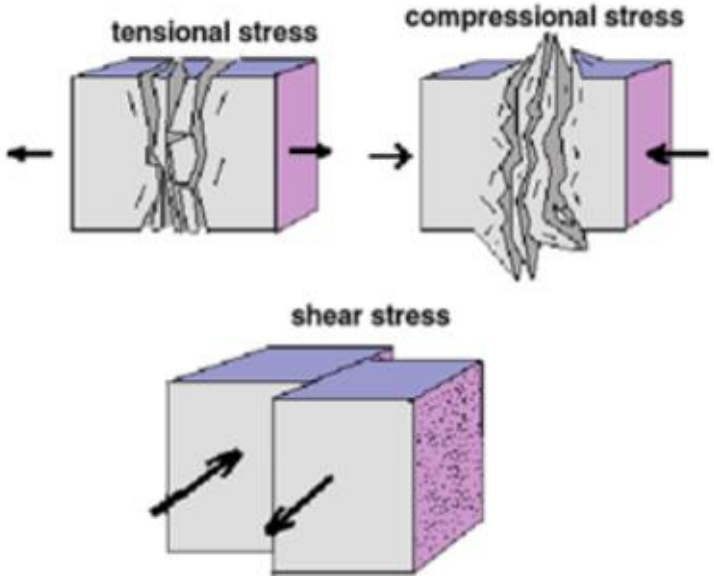


Figure 1.1. Different Kinds of Stress.

Source: *Different Kinds of Stress. Digital Image. FrontLearners. Accessed September 2, 2020. www.frontlearners.com*

Compressional stress occurs when layers of rocks squeeze inward. The kind of stress makes these layers of rocks either thicker or thinner. **Fold** formation happens during plate collisions. This is the result when compressional stress is applied, causing the rock layer along continental margins to crumple.

Folds can be described as either anticline or syncline, depending on the direction of the fold. *Anticline* fold is an upfold of rock layers. The other type of fold is the *syncline* fold. Syncline fold is the downfold or warping downward of rock layers.

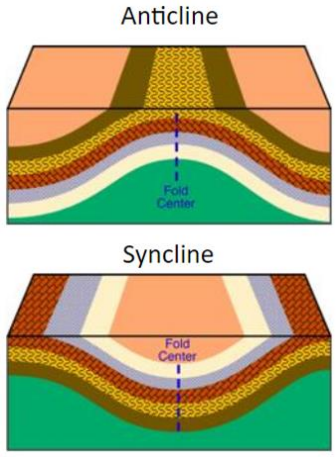


Figure 1.2. Types of Folds

Source: *Types of Folds. Digital Image. FrontLearners. Accessed September 2, 2020. www.frontlearners.com*

On the other hand, **faults** are formed when compression stress overcomes the internal strength of rock. This results in fractures, or the displacement of connected blocks of rocks along a fault plate. There are different kinds of faults depending on the type of stress that acts on the rocks, and the nature of the movement of the rock blocks.

Faults can be classified into normal faults and reverse faults. A normal fault is where the direction of the plates' movement is opposite each other, where one slab of rock is displaced up, and the other, down. A reverse fault happens when compressional stress causes the block of rock to be pushed over the other block.

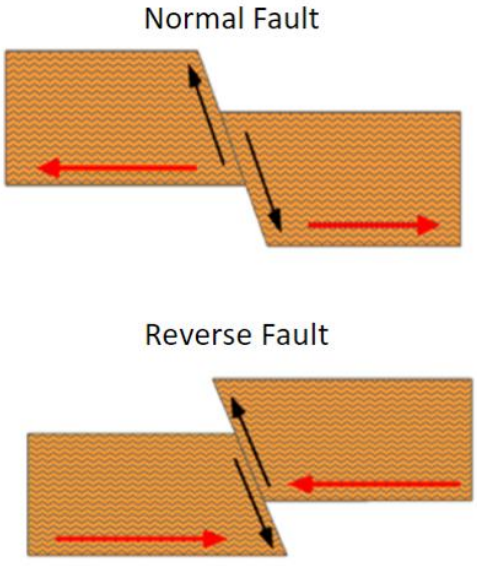


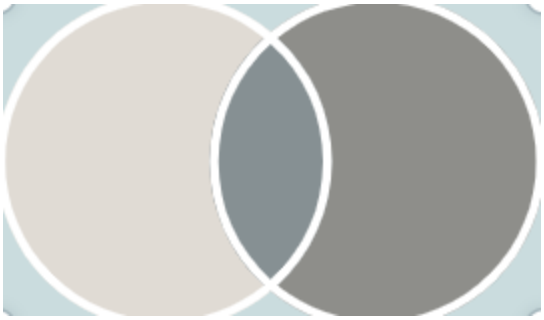
Figure 1.3. Normal and Reverse Fault

Source: *Normal and Reverse Fault. Digital Image. FrontLearners. Accessed September 2, 2020. www.frontlearners.com*

What's More

Activity 1.2. Comparing Fold and Fault

Use the following Venn Diagram to compare folds and faults in rocks. Copy and answer on a clean sheet of paper.



What I Have Learned

Activity 1.3. Lesson Summary

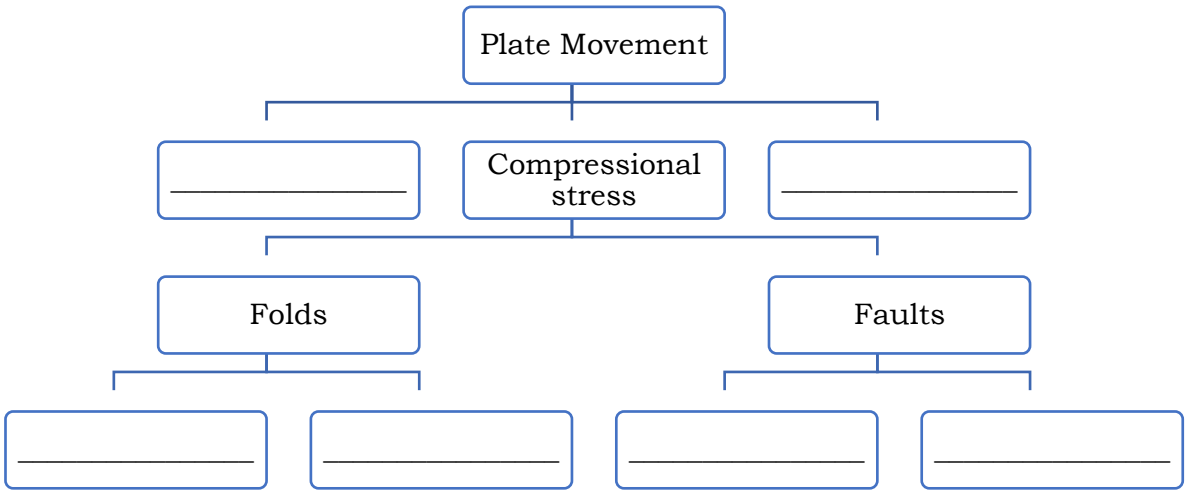
Summarize what you have learned in this lesson by filling in the gaps. Copy and answer the following on a clean sheet of paper.

Plate movements can cause different types of stress, which include _____, _____, and _____ stress. Compressional stress causes _____ and _____. Folds can be described as _____ or _____, depending on the direction of the fold, while faults can be _____or _____faults.

What I Can Do

Activity 1.4. Fold and Fault Concept Map

Fill in the gaps in the following concept map.



Assessment

Read each question carefully and encircle the letter of the correct answer.

1. Which of the following is **TRUE** about the different stress experienced by rocks?

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3. When the stress is released, rocks go back to their original shape. What type of deformation is this called?

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5. Which of the following refers to the technical term for pressure applied to rocks?

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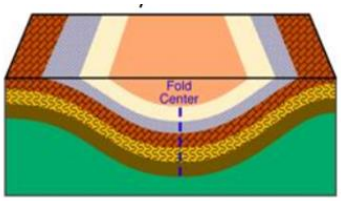

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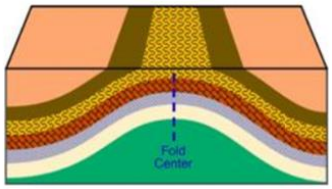

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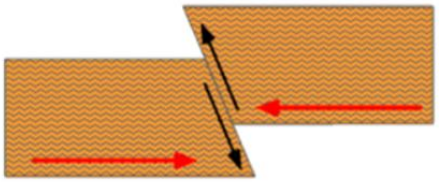

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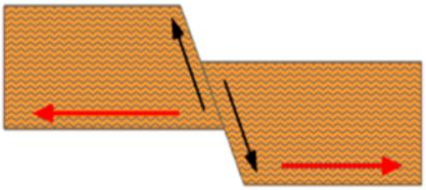

A. Normal
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Additional Activities

Write your reflection on the Folds and Faults by answering the questions inside the box. Express your critical and creative thinking skills in your answers. Have fun and enjoy!

The Folds and Faults topic guides me to ponder on ...	***What learnings have I found from this lesson?***	***What other examples can I contribute to explore and think more?***
What learnings can I share with my family and peers?	***What positive values have I developed from this lesson?***	***What is my conclusion on the lesson?***

Answer Key

What's New Activity 1.1	What's More Activity 1.2
1. Yes. Explanation may vary 2. (a) Fault (b) Fold	Both are formed from compressional forces. Faults result from brittle deformation where the compressional stress overcome the rock's internal strength. Folds result from plastic or ductile deformation that is less that the rock's internal strength.

What Have I Learned
Activity 1.3

Plate movements can cause different types of stress, which include tensional, compressional, and shear stress. Compressional stress causes folds and faults. Folds can be described as anticline or syncline, depending on the direction of the fold, while faults can be normal or reverse faults.

What I Can Do
Activity 1.4

References

(1)"Earth Rocks! | CCSF." CCSF CCSF. Accessed September 2, 2020. https://www.ccsf.edu/academics/schools/stem/earth-sciences-department/earth-rocks.

(2)"Geologic Structures | Geology." Lumen Learning – Simple Book Production. Accessed September 2, 2020. https://courses.lumenlearning.com/wmopen-geology/chapter/outcome-geologic-structures-from-deformation/.

(3) Welcome to STARBOOKS Online!. Accessed September 2, 2020. https://www.starbooks.ph/k12/12/7.

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