

EARTH SCIENCE Lesson Plan

Quarter 3, Week 5, Day 1



Outcomes for Today

Standard Focus: Earth Sciences 3.d “students know how and why earthquakes occur and the scales used to measure their intensity and magnitude” and 9.b “students know the principal natural hazards in different California regions and the geologic basis for those hazards”.

PREPARE

1. Background knowledge necessary for today’s reading.

The movement of the tectonic plates produces movements that deform the Earth’s crust. Stress refers to a force acting on a specified area. Three kinds of stress can be exerted on Earth’s rocks: compression, tension, and shear. Strain is the measure of deformation or change in shape. Low stress bends and stretches a material, but when it is released the material returns to its original shape, it is called elastic strain. When material is permanently deformed it is called ductile deformation. If the stress causes material to break, it is referred to as brittle deformation.

2. Vocabulary Word Wall.

Introduce 3-5 important words from today’s reading

stress strain compression tension shear

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch. 19.1

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- Most earthquakes occur when rocks fracture or break within the Earth.
- Fractures occur when stress, the force acting on the rocks, exceeds the strength of the rocks.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: Discovery Lab, p. 495 of the text

Procedure: Students model how movement along fractures cause earthquakes

Discussion: Discuss student experiences with earthquakes

Key question: How would you compare the two movements?

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world

EARTH SCIENCE Lesson Plan

Quarter 3, Week 5, Day 2



Outcomes for Today

Standard Focus: Earth Sciences 3.d and 9.b

PREPARE

1. Background knowledge necessary for today's reading.

The type of faulting in a given area indicates the stress orientation and is important for understanding a region's geology. Movement takes place along a fault plane. Which can be vertical, horizontal, or at an angle. The block of Earth above the fault plane is called the hanging wall. the block below is the footwall. The throw on a fault refers to the amount of offset across the fault.

2. Vocabulary Word Wall.

Introduce 3-5 important words from today's reading

fault reverse fault normal fault strike-slip fault fault plane

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch. 19.1, pp. 497

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- There are three basic types of faults.
- Reverse faults form as a result of horizontal compression.
- A normal fault moves both vertically and horizontally.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: A Model of Three Faults

Procedure: Students develop models of different fault types

Discussion: Discuss the relationship of plate tectonics to earthquakes and faults

Key question: What type of fault is caused by tension, compression or shearing?

Source: <http://interactive2.usgs.gov/learningweb/teachers/faults.html>

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world

EARTH SCIENCE Lesson Plan

Quarter 3, Week 5, Day 3



Outcomes for Today

Standard Focus: Earth Sciences 3.d and 9.b

PREPARE

1. Background knowledge necessary for today's reading.

Earthquakes produce seismic waves both on the surface and below it. Primary (P) waves and secondary (S) waves originate at the focus of the earthquake and are monitored at locations around the world. /the vibrations felt on the surface are actually two types: Rayleigh waves which cause the ground to move up and down in a rolling motion and Love waves that cause the ground to move side to side.

2. Vocabulary Word Wall.

Introduce 3-5 important words from today's reading

primary waves

secondary waves
focus epicenter

surface waves

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch. 19.1, pp. 498-499

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- Most earthquakes are caused by movements along faults.
- Earthquakes generate 3 different kinds of waves.
- The epicenter refers to the point on the Earth's surface directly above the focus.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: Seismic Waves

Procedure: Students use a slinky to discover differences between P- and S-waves

Discussion: Discuss types of waves

Key question: What are the differences between P- and S-waves?"

Source: http://visearth.ucsd.edu/VisE_teach/lessons/seismic_LP.html

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world

EARTH SCIENCE Lesson Plan

Quarter 3, Week 5, Day 4



Outcomes for Today

Standard Focus: Earth Sciences 3.d

PREPARE

1. Background knowledge necessary for today's reading.

P-waves are the fastest type of wave and their velocities increase at specific depths below Earth's surface. P-waves can travel through solids and liquids, so they can travel through the Earth's core (the outer core is liquid). S-waves can only travel through solids, so they do not travel through the Earth's core. The boundary between the Earth's crust and mantle is known as the Mohorovicic Discontinuity (Moho). It is a sharp boundary at which both P- and S-waves speeds increase.

2. Vocabulary Word Wall.

Introduce 3-5 important words from today's reading

Seismology seismometer seismograph

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch. 19.2, pp. 500-501

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- Seismology is the study of earthquake waves.
- Earthquake vibrations are detected and recorded by seismometers.
- Travel-time curves are used to find the distance from an earthquake's epicenter and the time the earthquake occurred.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: Walk-Run /Activity – An S and P- Wave Travel Time Simulation

Procedure: Students model how earthquake waves travel through Earth at different speeds

Discussion: Discuss differences between P- and S-waves

Key question: How do the speeds for the activity compare to the speeds of S- and P-waves?

Source: <http://web.ics.purdue.edu/~braile/edmod/walkrun/walkrun.html>

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world

EARTH SCIENCE Lesson Plan

Quarter 3, Week 5, Day 5



Outcomes for Today

Standard Focus

PREPARE

1. Background knowledge necessary for today's reading.

Seismic tomography was first introduced in the late 1970s. With the deployment of high-quality digital broadband seismic stations around the world finer imaging became possible starting in the early 1980s. Progress in seismic imaging has gone hand in hand with improvements in seismic sensor design, the capacity to digitally record massive quantities of data and the development of powerful computers to simulate seismic waves.

2. Vocabulary Word Wall.

Introduce 3-5 important words from today's reading

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

4. Read directions for investigation/activity.

5. Read text.

Ch. 19.2, pp. 502-504

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- The study of seismic waves has added to the knowledge of Earth's interior.
- P-waves are refracted at a distance of about 11,000km from the epicenter and then disappear.
- The study of meteorites supports data on Earth's composition from the study of seismic waves.

7. Post information on the billboard. Add new information to ongoing projects on the wall.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity: Walk-Run Activity – An S and P Wave Time Simulation, Part 2

Procedure: Students use time-travel graphs to locate the epicenter of a simulated earthquake by triangulation

Discussion: Discuss how seismic waves travel through the Earth

Key question: For seismic waves in the Earth, the travel time curves for P- and S-waves are curved. What can you infer from this observation?

Source: <http://web.ics.purdue.edu/~braile/edmod/walkrun/walkrun.htm>

EXTEND

11. Prompt every student to write a short product tied to today's reading.

12. Close with a short summary.

Extend the reading to the students' lives or to the world