1. What did Alfred Wegener’s theory of continental drift state?

2. Define Pangaea.

3. How do fossils help support the theory of plate tectonics?

4. Do you believe that the land that is now Antarctica was always frozen? Explain your answer.
1. What does the theory of plate tectonics state?

2. Wegener proposed that all of the continents on Earth were once joined in a single land mass called _____________________.

3. True or false (If false, explain): Pangaea is the only supercontinent in the history of planet Earth.

4. How do rocks help support the theory of plate tectonics?

5. If continents continue to drift, is it possible that a new supercontinent will form? Which continents might be next to each other 200 million years from now?
Changes in the Land Classwork

6th Grade PSI

Here is a list of all the locations from the introductory activity as well as the distances between each. Use the excavation site pair that you were given in the first activity. You may use a calculator to do solve each problem. Write out your work in the provided spaces.

The distances below represent how far the two points have separated from each other over the past 300 million (300,000,000) years.

Natal, Brazil and Lagos, Nigeria: 2,790 miles
Southport, South Carolina and Dakar, Senegal: 4,210 miles
Barcelona, Spain and Algiers, Algeria: 320 miles
Darwin, Australia and Eastern Antarctica: 4,680 miles
Dar es Salam, Tanzania and Western Antarctica: 5,990 miles

Distance (ft) per 1 million years:

1. Calculate the average distance at which your site moves every million years:
   a. Take the distance and divide by 300.

   b. Convert to feet by multiplying by 5,280 (There's 5,280 ft in 1 mile).

Distance (ft) moved per 1 million years: ____________________________

Distance (ft) per 1,000 years:

2. Calculate the average distance at which your site moves every thousand years:
   a. Take the distance and divide it by 300,000.

   b. Convert to feet by multiplying by 5,280.

Distance (ft) moved per 1,000 years: ________________________________
Distance (ft) per 100 years:

3. Calculate the average distance at which your site moves every 100 years:
   a. Take the distance and divide it by 3,000,000.

   b. Convert to feet by multiplying by 5,280.

Distance (ft) moved per 100 years: ____________________________________________

Use the information above to answer the following question:

4. Looking at how much your two sites move apart over the course of 100 years, do
   you think you would be able to notice a change in distance over the course of
   only 1 year? Why or why not?

___________________________________________________________________
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Energy Flow Classwork

6th Grade PSI

1. What is the energy of the sun known as?

2. What layer of the Earth is found directly below the crust?

3. Define convection.

4. Use “Differences in Air Temperature” slide: If there is smoke in a room, why is it important to get down on the floor?
Energy Flow Homework  

6th Grade PSI

1. What are two ways in which energy from the sun is important to life here on Earth?

2. Where does the energy required for the motion of Earth’s plates come from?

3. Fill in the blanks: Warmer air ________________ and cooler air ________________.

4. What causes substances within the Mantle to heat up? What causes these substances to cool down?
Mount Everest is probably the most famous mountain in the entire world. Its claim to fame is that it is the tallest mountain in the world – over 29,000 ft tall. (To put that in perspective, that is 5 ½ miles straight up!)

Believe it or not, Mount Everest is still growing. As the plates below it continue to converge, the mountain gets taller and taller. In fact, it has been determined that Mount Everest grows about 2 inches each year (before erosion). That may not sound like much, but do the math problems below to see how this can really add up!

1) Mount Everest can grow 2 inches each year. How many inches can it grow in 100 years?

2) Take your answer to #1 and convert it to feet (Remember: there are 12 inches in 1 foot).

   Fill in the blanks below. To convert inches into feet, you must divide by 12.

   \[
   \text{in} \times \frac{1 \text{ ft}}{12 \text{ in}} = \text{ft}
   \]

3) How many inches would Mount Everest grow in 1,000,000 years?

4) Take your answer to #3 and follow the steps in #2 to convert it to feet. Show your work:
5) **Challenge:** How many years will it take Mount Everest to grow from its current height (29,000 ft) to a height of **50,000 feet** (neglecting erosion and other processes that can affect the height)? Show the work below:
Types of Plate Interactions Classwork

6th Grade PSI

1. What happens at convergent boundaries?

2. How are divergent boundaries different than transform boundaries?

3. What is seafloor spreading and how does it affect the surface of the Earth?

4. How do mountains form?
Types of Plate Interactions Homework

6th Grade PSI

Use the map on the next page to answer the questions below:

1. What plates contain the major continents?

2. On which plate can the United States be found?

3. Give an example of each of the following:
   a. Two plates that have a convergent boundary
   b. Two plates that have a divergent boundary
   c. Two plates that have a transform boundary

4. Define subduction.
Natural Disasters Classwork

6th Grade PSI

1. Where do earthquakes occur?

2. Why are scientists unable to predict when an earthquake will occur?

3. True or False (if false, explain!): Tsunamis occur as a result of incredibly strong winds.

4. What are pros and cons of constructing sea walls as a means of protection against tsunamis?
1. Define *epicenter*.

2. Two earthquakes are measured over the course of one week. One measures as an 8 on the Richter Scale and the other is measured as a 4. Compare the amount of damage you would expect to find at each of the two sites.

3. What causes a tsunami?

4. Define *volcano*.

5. At what type of plate boundaries can volcanoes form?

6. What substances are released into the air as a result of a volcanic eruption?
**Answer Key**

**Pangaea Classwork**

1. Wegener theorized that all of the continents were once connected in one large land mass and that the land then “drifted” apart.
2. Pangaea is the name of the supercontinent that broke apart 200 million years ago.
3. Areas that are now separated by large bodies of water contain fossils of similar plants and animals, suggesting that those land masses were once connected.
4. Antarctica was not always a frozen land mass. Millions of years ago, this land was located on another part of the Earth and, according to the picture in the slides, was able to support plant life.

**Pangaea Homework**

1. The theory of plate tectonics states that the Earth’s surface is broken into large, rigid pieces (called plates) that move independently.
2. Wegener proposed that all of the continents on Earth were once joined in a single land mass called Pangaea.
3. False, Pangaea was not the only supercontinent, but it is the most recent.
4. Areas that are now separated by large bodies of water contain similar types of rocks and mountain formations. One example is the Appalachian Mountains in North America and the Caledonian Mountains in Europe. There are clues that hint that they were once one large mountain chain.
5. It is possible that the continents will shift so far that they will collide again and form another supercontinent. Possible collisions may vary, but examples could be North America-Asia, North America-Australia, Africa-Australia, or South America-Asia/Australia.

**Changes in the Land Activity**

Answers will vary based on which locations you were assigned. The answers below are organized by location.

**Natal & Lagos:**

*Distance per 1 million years*
1. a. 9.3 miles  
   b. 49,104 ft  
   \[49,104 \text{ ft per million years}\]  
   **Distance per 1,000 years**

2. a. 0.0093 miles  
   b. 49.104 ft  
   \[49.104 \text{ ft per 1,000 years}\]  
   **Distance per 100 years**

3. a. 0.00093 miles  
   b. 4.9104 ft  
   \[4.9104 \text{ ft per 100 years}\]

**Southport & Dakar:**

**Distance per 1 million years**

1. a. 14.03 miles  
   b. 74,096 ft  
   \[74,096 \text{ ft per million years}\]  
   **Distance per 1,000 years**

2. a. .01403 miles  
   b. 74.096 ft  
   \[74.096 \text{ ft per 1,000 years}\]  
   **Distance per 100 years**

3. a. 0.001403 miles  
   b. 7.4096 ft
7.4096 ft per 100 years

**Barcelona & Algiers:**

*Distance per 1 million years*

1. a. 1.067 miles
   b. 5,632 ft
   5,632 ft per million years

*Distance per 1,000 years*

2. a. 0.001067 miles
   b. 5.632 ft
   5.632 ft per 1,000 years

*Distance per 100 years*

3. a. 0.0001067 miles
   b. 0.5632 ft
   0.5632 ft per 100 years

**Darwin & E. Australia:**

*Distance per 1 million years*

1. a. 15.6 miles
   b. 82,368 ft
   82,368 ft per million years

*Distance per 1,000 years*

2. a. 0.0156 miles
b. 82.368 ft

82.368 ft per 1,000 years

Distance per 100 years

3. a. 0.00156 miles
b. 8.2368 ft

8.2368 ft per 100 years

Dar es Salam & W. Antarctica:

Distance per 1 million years

1. a. 19.967 miles
b. 105,424 ft

105,424 ft per million years

Distance per 1,000 years

2. a. 0.019967 miles
b. 105.424 ft

105.424 ft per 1,000 years

Distance per 100 years

3. a. 0.0019967 miles
b. 10.5424 ft

10.5424 ft per 100 years

4. Student answers will vary, but students should come to the consensus that you would not be able to notice a year-to-year change in distance because the amount will be so small.
If you would like to figure out the amount of feet per year with the students as a follow-up, you may follow these steps:

a) Divide the distance by 300,000,000 to get miles per year.

b) Multiply the number from step a by 5,280 to determine the amount of feet per year.

The largest amount will be Dar es Salam and W. Antarctica at 0.105 ft per year (or about 1.3 inches per year).

**Energy Flow Classwork**

1. The energy from the sun is called solar energy.
2. The layer of the Earth found directly below the crust is the mantle.
3. Convection – The warming of a substance caused by the circulation of different temperatures of air.
4. It is important to get down on the ground because the hot smoke rises to the top of the room and breathable air is near the floor.

**Energy Flow Homework**

1. **Possible responses**: The sun provides energy for photosynthesis, keeps our planet at a livable temperature, and can be converted to electricity through solar panels.
2. The energy required for the motion of Earth’s plates comes from inside the Earth. It comes from the heat of the mantle and the core.
3. Warmer air **rises** and cooler air **sinks**.
4. Substances in the mantle heat up when they get close to the hot outer core. As they heat up they rise. When they get near the surface (the crust) of the Earth, they cool down and sink.

**Growth of a Mountain Classwork**

1. 200 inches
2. 200 inches = 16.67 ft
3. 2,000,000 inches
4. 2,000,000 inches = 166,666.67 ft
5. **Challenge**:

   a. Students will first have to figure out how many feet Mount Everest needs to grow to get to 50,000 ft:
50,000 ft – 29,000 ft = 21,000 ft

b. Students will now need to determine the number of inches in 21,000 ft:

21,000 ft \times 12 = 252,000 inches

c. Mount Everest grows about 2 inches per year. How many years will it take to grow 252,000 inches?

252,000 inches / 2 = 126,000 years

It will take approximately 126,000 years for Mount Everest to grow to a height of 50,000 ft.

**Types of Plate Interactions Classwork**

1. At convergent boundaries, the two tectonic plates push into each other, or collide.
2. At divergent boundaries, the plates are moving apart from one another whereas at transform boundaries, they are still in contact with each other. At transform boundaries, the plates slide across each other.
3. Seafloor spreading occurs at divergent boundaries where magma from below the surface of the Earth surface. When this occurs, the magma pushes the older oceanic crust away and cools, forming a new surface.
4. Mountains form when convergent plates push into each other. The surface of the Earth folds up like the hood of a car that was in a head-on collision.

**Types of Plate Interactions Homework**

1. Where each of the major continents can be found:
   North America – North American Plate
   South America – South American Plate
   Asia – Eurasian Plate (parts on North American, Arabian, and Indian Plates)
   Europe – Eurasian Plate
   Africa – African Plate
   Antarctica – Antarctic Plate
Australia – Australian Plate

2. The United States can be found on the North American Plate.
3. Listed below are all possible examples for this question. Each combo is Plate A/Plate B:
   a. Convergent boundaries: Pacific/Australian, Pacific/N.American, Nazca/S.American, Indian/Eurasian
   b. Divergent boundaries: Antarctic/Australian, Antarctic/Pacific, Antarctic/African, African/Arabian, Indian/African, Eurasian/N.American, Nazca/Pacific
   c. Transform boundaries: N.American/Pacific

4. **Subduction** – The motion of one tectonic plate under another that sometimes occurs when two plates converge.

**Natural Disasters Classwork**

1. Earthquakes occur at faults within the Earth’s crust and at transform boundaries.
2. It is difficult to predict earthquakes because they happen within the Earth’s crust. It is also difficult to predict when two plates will finally slide past each other.
3. False, tsunamis occur most frequently as a result of an underwater earthquake. A tsunami occurs when there is damage to the surface of the Earth.
4. A positive thing about constructing a sea wall is that it can protect an area that is near the water from flooding. A negative aspect of relying on a sea wall is that it can only protect from waves of a certain height. If there is a large tsunami, a sea wall will be useless.

**Natural Disasters Homework**

1. **Epicenter** – The center point of an earthquake; the point that will feel the strongest vibrations from the quake
2. It would be expected that the earthquake that measured as an 8 on the Richter Scale would deal catastrophic damage. This damage would be way more than that done by a magnitude 4 quake.
3. Tsunamis are primarily caused by undersea earthquakes. When the ocean surface changes shape, the water above is displaced, causing it to flood over the land.
4. **Volcano** – an opening, or a vent, in the Earth’s crust that allows hot magma, ash and gases to escape.
5. Volcanoes can either form at convergent plates or divergent plates.
6. When volcanoes erupt, they release large amount of ash and gases into the atmosphere. They release water vapor, Carbon Dioxide and Sulfur gases, such as Sulfur Dioxide. Magma also flows onto the surface of the Earth as a result of the eruption.