Moving Continents and Plate Tectonics

According to the Law of Superposition, layers of rock are deposited in order of time, with the oldest layers on the bottom and the youngest layers on top. However, in the 1880s, scientists observed rock layers that did not seem to fit the Law of Superposition. Geologists observed older rock layers on top of younger layers. Scientists studying these formations believed they were due to what geologists called thrust faults, which are areas where one large layer of the earth is pushed up on top of another. At the time, the idea that the Earth’s crust moves vertically, geosynclinal theory, was widely accepted and believed to be the cause of the thrust faults.

Today, the scientific explanation for thrust faults and other natural phenomena, such as earthquakes, is plate tectonics. The theory of plate tectonics is the currently accepted model of large-scale movement of the Earth’s crust and upper mantle, the lithosphere. The plate tectonics model explains how major and minor plates of the lithosphere move relative to each other at plate boundaries. Evidence for plate tectonics is plentiful. Supporting evidence, based on decades of research, includes:

1. Complimentary coastlines of different continents. For example, the coastlines of South America and Africa look like they could fit together.
2. The distribution of similar rocks and fossils on far-apart continents. For example, rocks found in Scotland and Ireland are very similar to rocks in eastern Canada.
3. High mountains and deep-sea trenches that occur along plate boundaries.
4. Earthquake zones near deep-sea trenches and ridges.

Although scientific evidence supports plate tectonics, in 2008, over 20% of Americans incorrectly answered a question that asked if continents had been moving for millions of years and if continents would continue to move*. It is unclear whether those who got the question wrong did not understand the principles of plate tectonics or believe that the earth is much younger than scientific evidence suggests.

* National Science Foundation, Science and Engineering Indicators, 2012
Activity Questions:

1. The passage describes two scientific theories, one old, and one current. Name and describe those two theories and explain why the current model is considered to be a theory.

2. The passage describes one scientific law. Name and describe the law and explain why it is considered to be a law.

3. One hypothesis is described in the paragraph. Name and describe the hypothesis and explain why it is considered to be a hypothesis.

4. Several facts are given in the passage. List three facts and describe why they are facts.

5. Several opinions are stated or referred to in the passage. Give one example of an opinion and explain why it is an opinion.
6. Based on what you know about each of the different classifications of scientific language, explain the difference between each of the following:

a) hypothesis and opinion

b) fact and opinion

c) hypothesis and theory

d) law and fact

e) theory and law