Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_ Ast: \_\_\_

**Scientific Theories and Laws**

***Based on the cards you sorted with your group, write each of the characteristics where they belong on the Venn diagram below.***

***Read the passage and answer the following questions based on the passage.***

Characteristics of a Scientific Law

Characteristics of a Scientific Theory

Characteristics of Both

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*

1. The passage describes one **scientific law**. Name and describe this law.
2. Explain why this is considered to be a law and not a theory.
3. What happened when scientists found evidence that seemed to contradict this law?
4. The passage describes two **scientific theories**, one old, and one current. Name and describe both theories.
5. Why are these considered theories and not laws?
6. What led scientists to stop accepting the old theory and adopt the newer theory?
7. Think about the 6 characteristics of science (CONPTT). Pick three of them and explain how this passage provides an example of each.

|  |  |  |
| --- | --- | --- |
| Describes a pattern or an event in nature | Supported by large amounts of evidence | Explains a pattern or an event in nature |
| Example: Objects fall toward Earth. | Used to understand the natural world | Example: Gravity is a force that causes objects to fall toward Earth. |
| Example: The characteristics of species change gradually over large amounts of time. | Can be used to predict future findings | Example: Species who are better adapted to their environment are more likely to pass on their characteristics to future generations, causing a change in the species over large amounts of time. |
| Answers the question, “What happens?” | CAN change as new evidence is produced | Answers the question, “Why does this happen?” |
| Can support a theory | CANNOT change into each other | Can explain a law |
| Based primarily on observations |  | Based primarily on inferences |
| Always holds true under specific conditions |  | Provides generalizations that explain all available evidence |
| Descriptive |  | Explanatory |