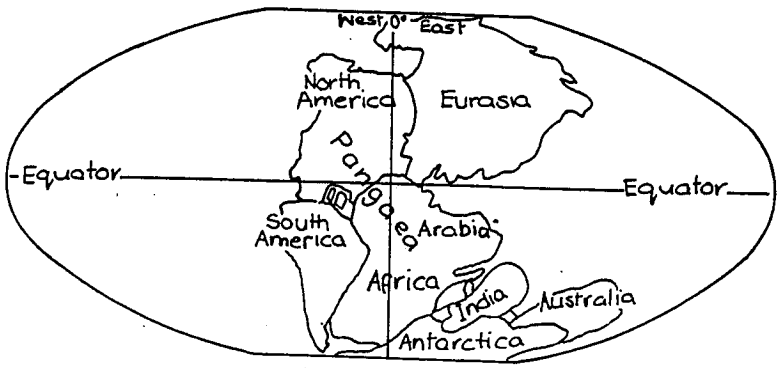
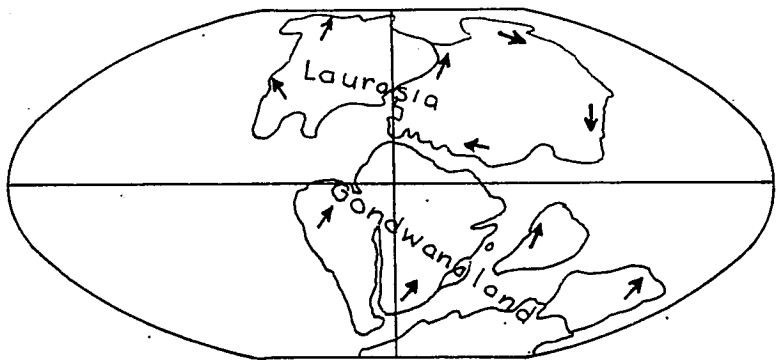
Science Reading Selection: The Theory of Continental Drift

In 1912, the German meteorologist and explorer, Alfred Wegener, presented the theory that the continents were once joined in one big land mass and have, over millions of years slowly drifted apart and into their present positions. He named this super-continent *Pangaea,* a Greek word meaning " all land". The rest of the Earth's surface was covered by a massive ocean called *Panthalassa.* Over time, Pangaea split into two subcontinents. Laurasia in the north contained present-day Asia, Europe and North America. Gondwanaland in the south included South America, Africa , India (then separate from Asia), Australia and Antarctica. Wegener's theory was fiercely rejected at the time. After all, "What did a meteorologist, an outsider, know about geology?" Since the 1960's however, this theory has gained acceptance amount most earth scientists.



250 MILLION YEARS AGO



140 MILLION YEARS AGO

Alfred Wegener was born in Berlin, Germany on November 1,1880. He studied astronomy and meteorology at the university and received his doctorate in 1904. As a teacher he inspired enthusiasm and strong loyalty in his students. He authored a meteorology textbook which was used throughout Germany.

Many theories of this type had been proposed in the past, but none was as based on fact as Wegener's. He used the a process of scientific investigation to develop his theory. This process is called the *scientific method* and can be used for solving any problem in any area of study. Wegener wondered about the evidence , "Why should tropical ferns have grown in London, Paris and even Greenland, and glaciers have covered Brazil and the Congo at the same time?" The clarification of his *problem* prompted Wegener to look in several places for information to support his idea. He collected evidence from rocks, fossils and the climate records of several other continents to show that they had once been joined tog ether. His idea about their locations in the past is called a *hypothesis*, an idea based on fact, but one which has not been proven yet by detailed investigation.

Ancient mountain systems called *cratons* showed a connection between the continental land masses. Rocks in Africa and South America are of the same age and type; the diamond fields of South Africa and Brazil are an example. Additional supporting evidence for this theory comes from the distribution of ancient and living organisms. Fossils of similar land animals have been found by paleontologists in the rocks of Asia, Europe, and North America. A change in the position of the continents would also explain why plants similar to those now found in tropical areas grew in Greenland and glaciers once covered the equatorial regions of Africa and Brazil. All of this *data* gave support to his theory and made it easier for scientists to accept it as a valid scientific theory.

After Wegener finished gathering and analyzing all of his evidence, he wrote and published his *conclusion*. After several decades of study, evaluation and discussion by scientists from around the world, it was accepted as the ***Theory of Continental Drift.***

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PART I: COMPREHENSION ACTIVITIES

1. Use the following words in a sentence to explain their meanings. Underline the word you are explaining.

   Example: An explorer is a person who travels and discovers unknown places on the Earth's surface.

   a. meteorologist

   b. theory

   c. subcontinent

   d. enthusiasm

   e. investigation

2. In your own words write out the theory that Wegener proposed about the positions of the continents.

3. Why was Wegener's theory so different?

4. What process is generally used in science to solve problems?

5. List the 5 steps used in the problem solving method Wegener used.

6. What were the two subcontinents that Wegener identified? Which present-day continents were a part of each of them?

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PART I:

7. After Wegener completed his investigations, he published his theory. How is this theory different from the hypothesis he stated at the beginning?

8. Why do you think it took so long for Wegener's theory to be accepted? Was this necessary? Why?

9. What physical process within the Earth could account for a "drifting" of the continents across the surface?

PART II: APPLICATION: "Drifting Apart"

1. Complete the attached sheet "Drifting Apart".
   - Label the continents.
   - Cut them out and mark North on each piece.
   - Position the pieces as they might have fit together as one supercontinent.
   - Glue the pieces into place.

2. Write out the step by step process you used to fit the continent pieces together.
   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

DRIFTING APART