

**I. Define the following terms.**

- A. Adaptation
- B. Evolution
- C. Extinction
- D. Fossil
- E. Fossil Record
- F. Index Fossil
- G. Law of Superposition
- H. Mutation
- I. Natural Selection
- J. Speciation
- K. Unconformity

**II. Describe the work of each of the following scientists.**

- A. Charles Darwin- theorized natural selection as a result of adaptations brought about by random genetic mutations that made certain organisms better suited to their environment
- B. Jean-Baptiste Lamarck- first suggested that organisms could change over time as a result of environmental influences. Thought that change could happen within one lifetime and be passed on to offspring in the next generation
- C. Alfred Wegener- proposed the theory of continental drift based on fossil evidence suggesting that the continents had once formed a supercontinent he called Pangaea. His work was validated by the theory of plate tectonics.

### III. Evolution of Landforms

**Describe Alfred Wegener's theory of continental drift. How does the theory of plate tectonics support Wegener's conclusion?**

**What evidence suggests that the continents of the modern world were once combined into a supercontinent?**

- Similar fossils on Africa's west coast and South America's east coast
- Coastlines of continents fitting together like puzzle pieces
- Plant fossils in the Arctic

**List the four divisions of geologic time in order from longest to shortest.**

(longest) Eon → Era → Period → Epoch (shortest)

**What one significant event separates the first eon of time from the second (current) eon?**

The rise of multicellular life

**What criteria do geologists use to separate divisions of geologic time?**

Major geologic events such as climate change or mass extinctions

**Describe each type of plate boundary**

<b>Boundary Type</b>	<b>Description</b>	<b>Landforms/Events</b>
Convergent	Two plates moving towards each other and colliding slowly	Mountains, Volcanoes
Divergent	Two plates moving away from each other	Mid-ocean ridge, trenches
Transform	Two plates moving in opposite directions, sliding alongside each other	Earthquakes

## What information about Earth's history can scientists obtain from ice cores?

Types and concentrations of gases in Earth's atmosphere

## What specific gases are measured in ice cores?

Carbon dioxide and methane

## Describe the relationship between atmospheric carbon dioxide and average global temperatures.

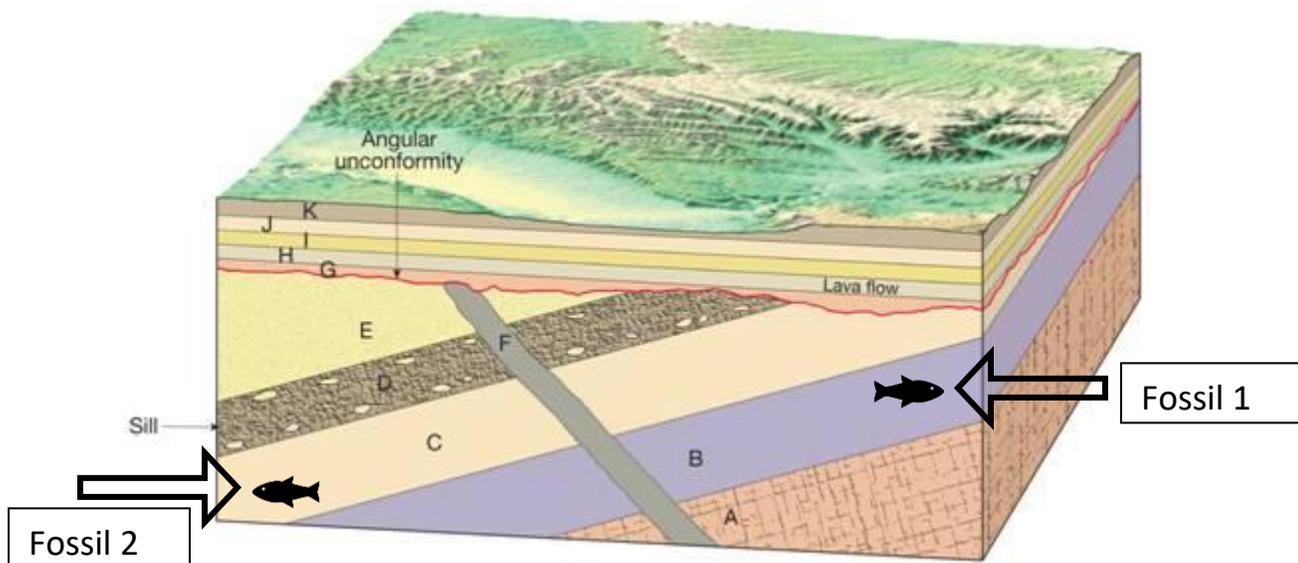
As CO<sub>2</sub> levels in the atmosphere rise, average global temperatures rise significantly

## Describe the similarities and differences between absolute and relative dating of fossils.

Both give scientists an idea of the age of fossils and rock layers. Relative dating is used to determine age compared to something else- is this fossil older than another fossil? Younger than expected? Absolute dating uses traces of radioactive isotopes as they decay to determine a much more exact age by calculating how long ago the isotope was present in its original amount.

## What are index fossils? How can they be used to estimate the ages of rock layers?

Fossils of a species found for a limited amount of time but with worldwide distribution. The approximate dates of existence for these species are known, so finding these fossils indicates that surrounding rocks and fossils are around the same age.



**In the image above:**

**In which layer would you expect to find the oldest fossils? Why?**

Layer A is the oldest layer and should contain the oldest fossils

**Is layer F older or younger than layer E? Explain how you know.**

Younger than layer E- F has pushed its way through layer E and must have formed after E was already present.

**Dr. Alfred Ramirez unearthed Fossil 2 from a study site and compared it to Fossil 1, discovered by Dr. Vanessa Bridges. They did not agree on which fossil was the oldest.**

**Dr. Ramirez: "Fossil 2 was found at a depth of 400 feet, which is deeper than Fossil 1. Therefore, it must be older than Fossil 1."**

**Dr. Bridges: "Fossil 1 was found in layer B, which is older than layer C. Therefore, it must be older than fossil 2."**

**Which scientist is correct? Explain your answer.**

Dr. Bridges is correct. The rock layers have shifted to an angle, possibly due to a fracture or earthquake. Because layer B formed, enclosing fossils, before C, Fossil 1 was present before layer C existed.

#### **IV.Evidence for Evolution**

**Briefly describe Charles Darwin's theory of evolution.**

*See Evolution of Lifeforms slides*

**When considering "survival of the fittest", what is meant by "fit"?**

Best suited or adapted to a particular environment

**Explain adaptations and describe two examples.**

**Complete the chart outlining anatomical evidence for evolution.**

	<b>Homologous Structures</b>	<b>Analogous Structures</b>	<b>Vestigial Structure</b>
<b>Description</b>	<i>See Overview of Earth's History &amp; the Evidence for Evolution</i>		Structures present in an organism's body that have no current significant
<b>Examples</b>			Human appendix, tonsils, tailbone, goosebumps
<b>How does it support the theory of evolution?</b>			As species evolve, certain structures are no longer needed for life processes or survival

**Describe the process of speciation.**

A population of a species that is isolated from any other group can develop traits and mutations over time in response to environmental conditions that ultimately create unique descendants who can no longer reproduce with other members of the same original species.

**How does embryology support the theory of evolution?**

As organisms develop before birth, there are an astounding number of similarities in the process of development and the developmental structures present.