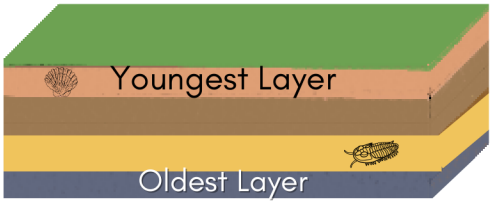
Name:_____ Date:_____

Index Fossils

Fossils are the preserved remains of living things from 10,000 years ago or more. Usually fossils form when organisms are quickly buried in sediments and then are replaced by stone and minerals over time. This leaves behind an impression, model, or remains of an organism or its activity. There are fossils of animals, plants, fungi, and even tiny fossils of bacteria and microscopic organisms. **Paleontologists** are the scientists who study fossils and excavate (dig) them from the ground. Fossils help scientists to learn about what life was like in Earth's past- before humans. Fossils have also helped scientists learn about the climate and even where the continents were in the past on Earth. We call the history of the Earth **geologic time**.

Fossils can be found underground where they have to be excavated (dug up), or they can be found on the surface due to moving tectonic plates and erosion. Fossils form in **sedimentary rock**. When sediments like pebbles, sand, and soil are deposited on the ground by wind, water, or gravity they create a layer. Over time many layers build up like the layers of a cake. These layers of sedimentary rock are called **strata**. **The law of superposition** states that the bottom layer in strata is the oldest and the top layer of strata is the youngest. So as you dig down in strata the layers are getting older and older.



The same thing is true for fossils found in the rock layers. If you find two fossils and one fossil is above the other fossil in the rock strata, the one on top is younger than the lower fossil. The law of superposition helps us to find the **relative ages** of different fossils- which fossils are older and younger.

Certain fossils help scientists know what time period a layer of rock came from just by looking at it. This allows scientists to be more accurate with their relative dating. These fossils are called **index fossils**. A fossil has to meet three criteria in order to be considered an index fossil. An index fossil is a fossil that is **abundant**. Abundant means it is easy to find. An index fossil also need to be **widespread** which means it is found all over the world. Lastly, an index fossil needs to be **short-lived** which means it only existed for a short period of time. Let's look at an example of an index fossil. An example of an index fossil is an ammonite shell. **Ammonites** were organisms that lived in shallow parts of oceans all over the world. They looked like octopi with spiral shells. There were many different varieties that evolved quickly and lived for a short period of time. If we find an ammonite fossil we know that the rock layer it is in is hundreds of millions of years old. The exact kind of ammonite found will give a more exact date.

1.) What are fossils? How do they form?

2.) What have fossils taught us about the Earth's history?

3.) What kind of rock holds fossils? Why do you think fossils don't form in igneous (volcanic) rock?

4.) What does strata mean? How is strata like a cake?

5.) The absolute age of a fossil can be found in a lab using radiometric dating. Why do you think scientists will sometimes use relative dating instead? What are the benefits?

6.) What are the three characteristics of a good index fossil?

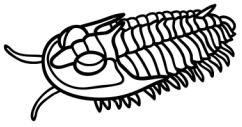
7) Crocodiles have existed in slightly different variations from before the time of the dinosaurs and they exist even now on Earth! Would a crocodile be a good index fossil? Why or why not?

8.) If a fossil is very delicate and breakable why **wouldn't** it be a good index fossil?

9.) If shark fossils are found below flowering plant fossils, then what does that tell you about their relative ages? (Which is older and younger in geologic time?)

10.) Do you think microfossils of bacteria and microscopic organisms would make good index fossils? Why or why not?

11.) The trilobite is a common index fossil similar to an ancient horseshoe crab. What three traits must a trilobite have to be an index fossil?



Use the diagram of sedimentary rock strata, outcrop below to answer the following questions. **Remember:** an index fossil shouldn't show up in multiple layers because that means the organism occurred for a longer duration of time. (These are not real fossils)

12.) Do you think the rocks in the outcrop were formed on land or under the ocean? Why?

13.) Could this fossil  be an index fossil? _____

14.) Could this fossil  be an index fossil? _____

15.) Could this fossil  be an index fossil? _____

16.) Could this fossil  be an index fossil? _____

17.) If this fossil  was 500 million years old, how old could this fossil  be?

a.) 200 mya **b.)** 500 mya **c.)** 550 mya

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