

The Age of Earth

Lesson 1 | Relative Ages of Rocks

Commented [1]: Overall, excellent work!

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1. Explain What is the principle of uniformitarianism?

Geologists, like all scientists, search for ideas to explain how Earth's processes work. Hutton had an idea that "the present is the key to the past." His principle of uniformitarianism states that the processes that are at work today are the same processes that have been at work in Earth's past. The speed of the process and the size of the area may change, but the processes do not. Uniformitarianism allows scientists to look at Earth's surface to interpret the changes that have taken place in Earth's past.p.81(paragraph 2)

2. Identify Circle the names of the three major types of rock.

You can trace the formation of the three major types of rocks—igneous, sedimentary, and metamorphic—on p.82(paragraph 2)

3. Explain What forces result in a metamorphic rock?

Metamorphic rock is any rock that has been put under extreme heat or pressure. The rocks that are most affected are those that come in contact with hot fluids and magma moving through fractures toward the surface.p.83(paragraph 2)

4. Name one example of physical weathering.

The physical breakdown or chemical breakdown of rocks into smaller pieces is called weathering. It is the first step in forming sedimentary rocks. Physical weathering breaks down rocks without changing the mineral composition. Frost wedging, shown in the figure on the next page, is the weathering process that occurs when water freezes and expands in cracks.p.83(paragraph 4)

5. Describe Over time, what will happen to this rock if freezing continues

The freezing will continue.

It is the weathering process that occurs when water freezes and expands in cracks.p.83(paragraph 4)

6. Define What is another term for sediments?

Sediments vary in size from large boulders to microscopic bits of rock. These different-sized pieces of sediment are called clasts.p.83(paragraph 2)

8. Apply Where would the largest rocks be deposited along the course of a fast-moving river?

Deposition occurs when sediment being transported by moving water, wind, or a glacier slows down or stops. This usually happens in low areas on the landscape called depositional environments. Another characteristic of deposition is sorting. Sorting proceeds as the carrier of the sediment slows down. Heavier objects are dropped first. Lighter and lighter objects are carried farther and deposited later.p.85(paragraph 1)

10. Confirm In an undisturbed layer of rock, which layer is oldest?

(Circle your answer.)

a. the top layer

b. the bottom layer

The principle of superposition states that the layers on the bottom of an undisturbed sedimentary rock layer were deposited before the layers on top. That means that the rocks on bottom are older than the rocks on top.
p.86(paragraph2)

11. Explain Using Steno's principles, which rock

is younger? (Circle your answer.)

a. a boulder protruding from a cliff

b. the floor of a canyon

Nicolas Steno stated four principles that help scientists determine the order, or the relative ages, of these geologic events. The rock cycle outlines the formation processes of the three main types of rock—igneous, metamorphic, and sedimentary.p.87(paragraph 2)

1. Identify Which part of an atom of a given element is always the same?

a. number of protons

b. number of neutrons

Isotope is the term for atoms of a given element that have the same number of protons, but a differing number of neutrons.p.89(paragraph 2)

2. Name the natural clock scientists use to find the age of rocks.

Radioactive decay occurs automatically and at a regular rate. This decay is the natural clock that scientists use to find the ages of Earth's rocks.p.89(paragraph 3)

4. Determine What is the percent of parent material in 1 half-life?

It is hundred percent.p.90(graph)

5. Sequence What is the first step scientists use in radiometric dating?

Scientists first measure the amount of parent material in a rock. Then they compare that number to the amount of daughter material in the rock. With that comparison, the number of half-lives the material has been through can be counted.p.91(paragraph 2)

6. Explain Why is it difficult to determine the age of a metamorphic rock?

Because constant movement of rocks through the rock cycle could have destroyed Earth's oldest rocks.

Geologists wondered whether the constant movement of rocks through the rock cycle would have destroyed Earth's oldest rocks.p.91(paragraph 3)

7. Explain How does the age of the Moon relate to the age of Earth?

Rocks brought back from the Moon are approximately 4.6 billion years old. The closeness of the ages calculated for rocks from meteorites, the Moon, and Earth help to confirm the idea that the entire solar system formed at the same time. So, the

absolute age of Earth is about 4.5 billion years, the age of the oldest-known rock in our solar system.p.92(paragraph 1)

8. State Earth's approximate age.

Earth's age has been calculated to be about 4.5 billion years, the age of our solar system's oldest rocks.p.92(paragraph 2)