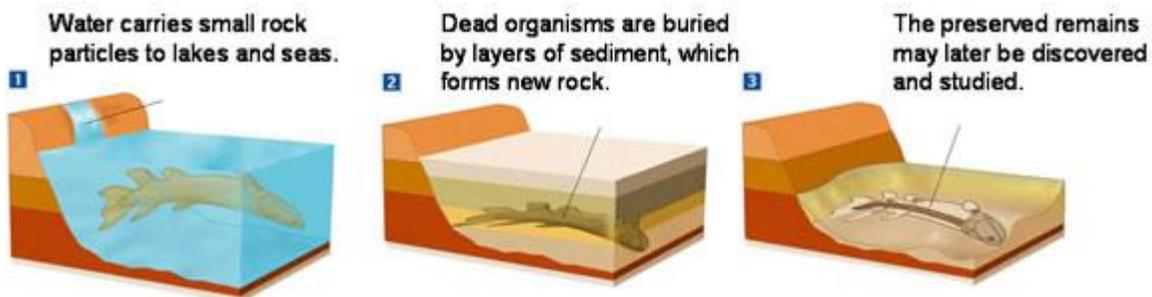Objectives

⦿ Describe how fossils reveal information about ancient life.

⦿ Describe how we date events in Earth's history.

⦿ Explain what the geologic time scale is, and be able to list its major divisions.

⦿ Analyze how Earth's environment and it's organisms affect each other.

Fossil Evidence

⦿ Provides much of evolutionists evidence

⦿ Most fossils formed when organism is _____ _____, which prevents bacteria from decomposing

⦿ Hard parts (bones, teeth, shells, etc) most common

⦿ Other fossils- frozen mammoths, insects trapped in amber, minerals leaching into organism

Fossil Formation Images

Water carries small rock particles to lakes and seas.

Dead organisms are buried by layers of sediment, which forms new rock.

The preserved remains may later be discovered and studied.

Dating Earth's History

⦿ Two types of dating

⦿ **relative dating**

◉ **radiometric (absolute) dating**

Relative Dating

- ◉ Places rock layers and their fossils in a _____
- ◉ _____ on the bottom, _____ fossils on top.
- ◉ Scientists must use **index fossils** to determine how old other fossils are
  - • index fossils- _____ _____ (ex: trilobites)
- ◉ Relative dating just tells you how old a fossil is RELATIVE to other fossils, it _____ of a fossil in years!

Relative Dating Example
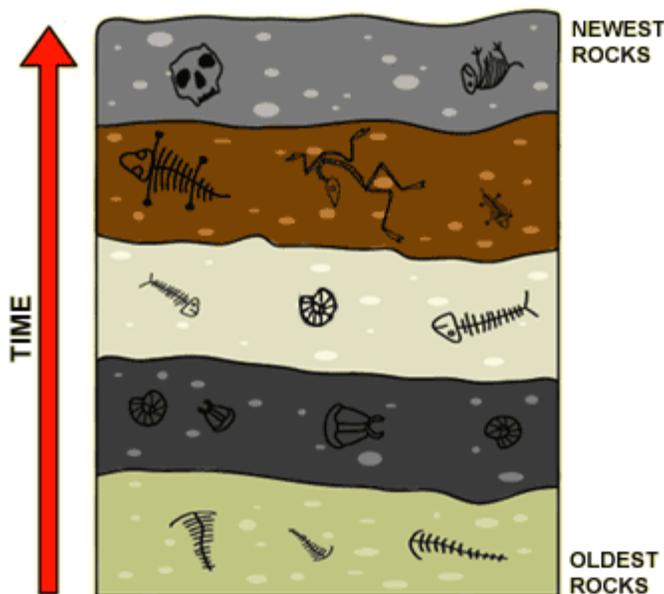
Radiometric Dating

- ◉ Uses _____ to determine a fossils age in years
- ◉ Radioactive isotopes _____ as they decay to form stable isotopes
- ◉ The rate of decay is constant for a radioisotope

◉ By measuring the _____
_____, we can estimate how old a fossil is

Half-Life

◉ **half-life**: _____

_____

 • ie: **For every half-life that passes, the amount of radioisotope remaining is cut in half!**

◉ Each type of radioisotope decays at a different rate

◉ ex: carbon 14 has a half life of _____ years, can be used to measure objects that are less than 60,000 years old

◉ ex 2:   potassium-40 has a half life of _____, so can be used to determine ages of much older things

Quick Lab:

• Find a partner

• Take a sheet of paper, cut out 100 1-cm squares.

• Place an X on each square.

• Put the squares in a cup.

• Mix squares in the cup and dump out.

• Remove all the squares that show an X, and record how many squares are left in the data table below.

• Return the unmarked squares to the cup.

• Repeat steps 5-7 until there are 5 or fewer squares left.

• Make a graph with the number of spills on the x axis, and the number of squares remaining after each spill on the y-axis

Data Table for Quick Lab

Spill Number	Number of Squares Returned

Questions

- How many spills did you need to remove half the squares? To remove ¾ of the squares?

- If each spill represents 1 year, what is the half-life of the squares?

The Geologic Time Scale

- ⦿ Paleontologists developed the geologic time scale by studying _____

- ⦿ Where _____ or mass extinctions occur, boundaries between different eons, eras, and periods were established
- ⦿ The ages were then determined using radiometric dating

- ⦿ Geologic Time Scale demonstration…

Divisions of the Geologic Time Scale

- ⦿ Largest divisions are _____
- ⦿ eons broken down into _____
- ⦿ eras broken down into _____
- ⦿ Names come from locations of rocks, or some other feature of that period
  - • ex: Cambrian period named after Cambria, where rocks were first found

Changing Earth

- ⦿ Earth is constantly changing
  - • ex: _____ into today's continents
- ⦿ Earth's features have affected organisms
  - • ex: _____, which forces organisms to evolve to the change
- ⦿ Organisms have also affected Earth!
  - • ex: _____ changed the composition of Earth's atmosphere, which allowed organisms to move up on land
  - • ex 2:   humans have caused drastic changes to our planet