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# Warm-Up | Geologic Time

## Lesson Question

## Lesson Goals

**Explain** why the geologic time scale is used to show Earth's history.

**Distinguish** the _____ of the geologic time scale.

**Explain** how Earth has evolved over geologic time.

## Words to Know

*Fill in this table as you work through the lesson. You may also use the glossary to help you.*

| | |
|---|---|
| era | one of three long and distinct _____ of geologic time |
| evolve | to develop gradually over time, often from a simple to more _____ form |
| fossil record | a record of life on Earth based on the examination of _____ remains |
| geologic time scale | a scale used to describe the _____ of events in Earth's long history |
| index fossil | a fossil of a known geologic age used to determine the relative _____ of a rock layer |
| period | a length or _____ of an era |

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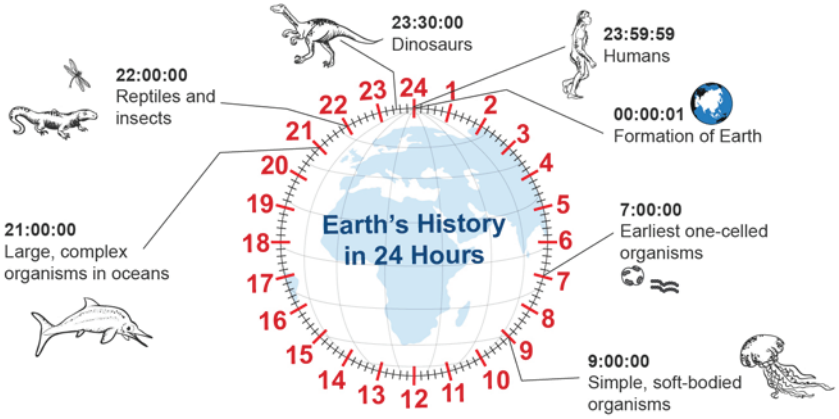
# Warm-Up | Geologic Time

## Earth's Geologic History




- _____ and insects did not appear until 10 p.m.
- _____, which lived hundreds of millions of years ago, did not appear until 11 p.m.
- Now look where _____ fall on this clock—humans didn't arrive on the scene until close to 12 a.m.

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Slide 2

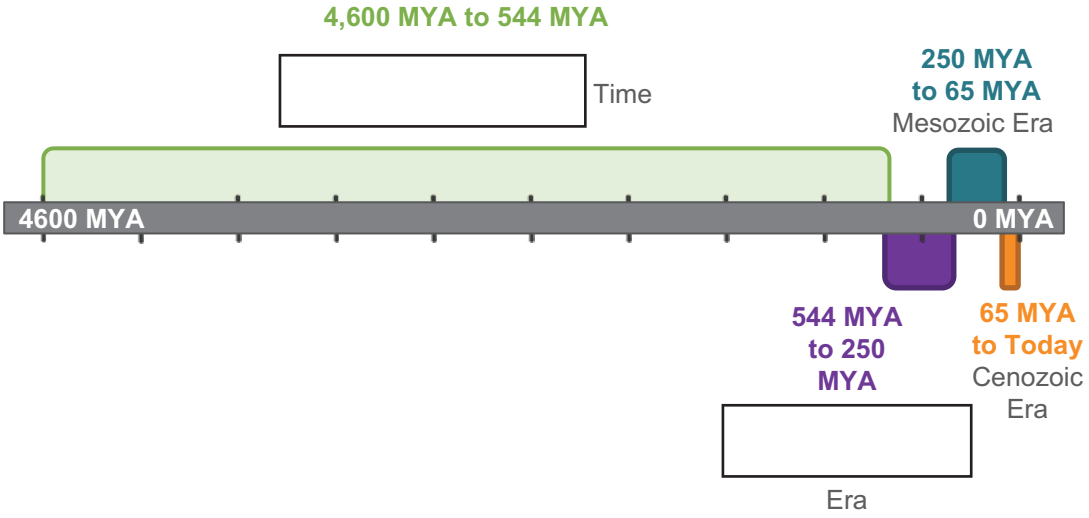
## Geologic Time Scale

The **geologic time scale** is used to describe the [ ] of events in Earth's long history.

- Created by scientists who studied [ ] layers and **index fossils**

The **fossil record** helps geologists determine when one [ ] of geologic time ended and when the [ ] one began.

## Geologic Time Scale




## Paleozoic Era

After Precambrian time, geologic time is divided into **eras** and [ ].

The first is the Paleozoic era, which spanned from [ ] million years ago to [ ] million years ago.

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## Mesozoic Era

The Mesozoic era follows the Paleozoic era.

- Lasted from 250 million years ago until 65 million years ago
- Included Triassic, Jurassic, and _____ periods
- Was the time when most well-known _____ lived
- Included the first birds and _____ plants

## Cenozoic Era

The current era is the Cenozoic era.

- Began about 65 million years ago
- Divided into Paleogene, Neogene, and _____ periods
- Saw the emergence of _____, including humans

Slide 5

## Age of Earth

Scientific evidence suggests that Earth formed around 4.6 billion years ago.

- Scientists have used _____ dating to date rocks and meteors.
- This helps them determine the approximate age of Earth.

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Slide 5

## Formation of Earth

Scientific evidence suggests that Earth started as a ball of dust, rock, and ice.

- Materials were pulled together by [ ].
- Energy from collisions increased [ ], causing the materials to melt.
- Dense melted material sunk toward the center, forming Earth's core.
- Heat was lost to surrounding space, causing less dense material to harden and form the [ ] and mantle.
- Earth's gravity captured hydrogen and helium to form the first atmosphere.
    - The Sun released a strong burst of particles that blew away this atmosphere.

## Formation of the Moon

The moon formed around the same time as Earth.

- Moon rocks help scientists determine the age of the moon.
- The moon formed from material on Earth.
    - Earth collided with a large object, throwing material into [ ].
    - This material [ ] to form the moon.

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Slide 7

## Precambrian Time: The Atmosphere

During Precambrian time, Earth's new atmosphere began to form.

- The early atmosphere contained carbon dioxide, water vapor, and [ ].
- Life on Earth today could not exist in this atmosphere.
- Gases were added to the atmosphere by [ ] and collisions with comets.

## Precambrian Time: Oceans and Continents

During Precambrian time, oceans and continents began to form.

- Due to high temperatures, water on Earth's surface evaporated.
- As Earth's surface cooled:
  - water [ ] and collected to form oceans.
  - rock [ ] to form continents.

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Slide 7

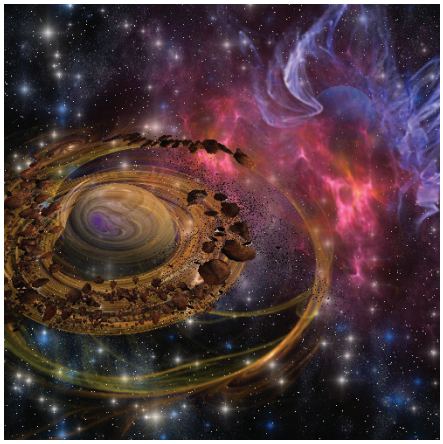
## Life on Earth

Scientists do not know the exact date when life began on Earth.

- Fossils of single-celled organisms date back to about [ ] billion years ago.
  - All other life forms **evolved** from these.
- Organisms began to [ ], which released oxygen into the air.
  - Some oxygen in the atmosphere formed ozone, blocking harmful ultraviolet (UV) rays from the Sun.

## Heat in Earth's Formation

Heat during the formation of [ ] came from three sources.



- Collision of materials

  First, heat was produced by the impact of [ ] materials as gravity pulled materials together.

- Compaction of materials

  As the materials came together and Earth grew bigger, its gravitational field increased. As a result, Earth continued to attract more materials, as shown in this image. It became more [ ]. This process, known as compaction, also produced heat.

- Radioactive decay

  The third source of heat is radioactive decay.

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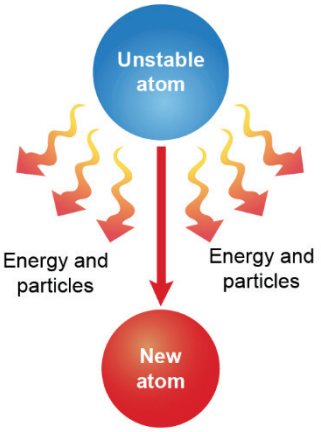
## Radioactive Decay

Some atoms can undergo radioactive decay.

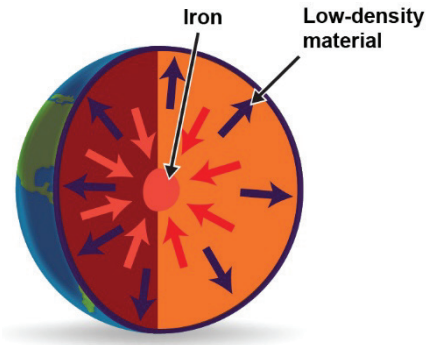
- _____ elements have a consistent number of smaller particles.
- Unstable, or radioactive, elements _____ smaller particles.
  - This process is called radioactive _____.



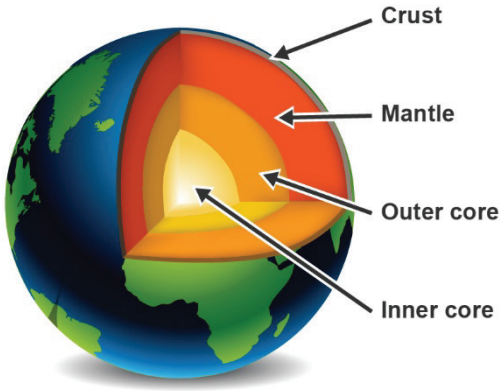

## Formation of Layers

Heat allowed protoplanets, such as Earth, to form different _____.

- Metals, such as iron, began to melt.
- High-density metals began to sink toward Earth's _____.
- Low-density materials rose toward Earth's surface.




- The heating, melting, sinking, _____, and rising processes helped form the different _____.

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# Summary | Geologic Time

**Lesson Question**

How is the geologic time scale used to show Earth's history?

**Answer**

Slide 2

## Review: Key concepts

- The geologic time scale was developed by scientists using the fossil record.
- Geologic time is divided into eras and _____.
- Precambrian time accounts for _____ percent of Earth's history.
- Earth and the moon formed about _____ billion years ago at the start of Precambrian time.
- As Precambrian time continued, conditions on Earth changed to allow life on Earth to begin.
- Life on Earth evolved with the changing _____.

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*Use this space to write any questions or thoughts about this lesson.*

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