# Unit 3: History of Earth

**Driving Question:** Can we really comprehend geologic time?
**Anchor Phenomenon:** The Cosmos "Cosmic Calendar" Scene
**Duration:** 17-20 days

**Unit Overview:** In this unit, students will investigate the major events that shaped Earth from its formation to the present day. Topics include the early Earth, the development of the atmosphere and oceans, and the rise of life that transformed the planet's systems. Students will then examine geologic processes such as plate tectonics, mountain building, and mass extinctions that create patterns in Earth's long term changes. Through models, fossil evidence, and investigations, students will understand how Earth's dynamic history influences the environment we live in today.

Performance Expectations [PE]:

- HS-ESS1-5: Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.
- HS-ESS1-6: Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
- HS-ESS2-1: Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
- PS1.C: Nuclear Processes: (NYSED) Spontaneous radioactive decay follows a characteristic exponential decay law allowing an element's half-life to be used for radiometric dating of rocks and other materials.

| | Identifying the Driving Question | Unit 3: History of Earth | | | | |
|---|---|---|---|---|---|---|
| | | Precambrian Eon | Paleozoic Era | Mesozoic Era | Cenozoic Era | |
| Anchor Phenomenon Activity | Can we really comprehend geologic time? | How did the Precambrian set the stage for us? | What events define the era and provide evidence for plate tectonics? | What events define the era and provide evidence for plate tectonics? | What events define the era and provide evidence for plate tectonics? | Anchor Phenomenon Activity |
| Cosmic Calendar Video Clip<br>Short-form Video | Driving question board.<br>Driving Question Board Activity | How Earth Was Made Birth of the Earth<br>Full-length Video | Burgess Shale<br>Short-form Video | Quick Read Alfred Wegener<br>Short-form Video | Quick Research Advancements in Tech<br>Quick Group Research | Cosmic Calendar Video Clip<br>Short-form Video |

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## Anchor Phenomenon Activity

*Can we really comprehend geologic time?*

### Scope and Sequence of Activities

| Cosmic Calendar from Cosmos | Life and Extinctions Artifact Walk | Student Lead Question Creation | Identifying the Driving Question |
|---|---|---|---|
| Short-form Video | Station Rotation Activity | Driving Question Board Activity | Driving Question Board Activity |

### Resources and Links

| | | | |
|---|---|---|---|
| Link: Cosmic Calendar | | | |

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## Precambrian Eon

*How did the Precambrian set the stage for us?*

| Key Concepts | Performance Expectations |
|---|---|
| 1. Evidences of the Age of Earth<br>2. Radiometric Dating / Nuclear Processes<br>3. ESSRT: Geologic History of New York State<br>4. ESSRT: Geologically Important Radioactive Elements | HS-ESS1-6: Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.<br>PS1.C: Nuclear Processes: (NYSED) Spontaneous radioactive decay follows a characteristic exponential decay law allowing an element's half-life to be used for radiometric dating of rocks and other materials. |

### Scope and Sequence of Activities

| Introduction | Discovery | Notes | Revisit | Practice | Evaluate |
|---|---|---|---|---|---|
| How Earth Was Made<br>Birth of the Earth | Investigation<br>Radiometric Dating | Keynote w/<br>Class Notes | Wrap-up<br>Radiometric Dating | Question<br>Clusters | Assessment<br>[10 question] |

### Supplemental Materials

| | | | | | |
|---|---|---|---|---|---|
| | Exploration<br>Precambrian Eon | | | | |

### Resources and Links

| | | | | | |
|---|---|---|---|---|---|
| Video - Link | | | | | |

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## Paleozoic Era

*What events define the era and provide evidence for plate tectonics?*

| Key Concepts | Performance Expectations |
|---|---|
| 1. Plate Tectonics [continental evidences]<br>2. Mountain Building Interactions<br>3. ESSRT: Geologic History of New York State | HS-ESS1-5: Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.<br>HS-ESS2-1: Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features. |

### Scope and Sequence of Activities

| Introduction | Discovery | Notes | Revisit | Practice | Evaluate |
|---|---|---|---|---|---|
| Short-form Video<br>Burgess Shale | Investigation<br>Mountain Building | Keynote w/<br>Class Notes | Investigation<br>Wrap-up | Question<br>Clusters | Assessment<br>[10 question] |

### Supplemental Materials

| | | | | | |
|---|---|---|---|---|---|
| | Exploration<br>Paleozoic Era | | | | |

### Resources and Links

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

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## Mesozoic Era

*What events define the era and provide evidence for plate tectonics?*

| Key Concepts | Performance Expectations |
|---|---|
| 1. Plate Tectonics [Wegener's Evidences]<br>2. ESSRT: Geologic History of New York State | HS-ESS1-5: Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.<br>HS-ESS2-1: Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features. |

### Scope and Sequence of Activities

| Introduction | Discovery | Notes | Revisit | Practice | Evaluate |
|---|---|---|---|---|---|
| Quick Read<br>Alfred Wegener | Investigation<br>Continental Drift | Keynote w/<br>Class Notes | Investigation<br>Wrap-up | Question<br>Clusters | Assessment<br>[10 question] |

### Supplemental Materials

| | | | | | |
|---|---|---|---|---|---|
| | Exploration<br>Mesozoic Era | | | | |

### Resources and Links

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

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## Cenozoic Era

*What events define the era and provide evidence for plate tectonics?*

| Key Concepts | Performance Expectations |
|---|---|
| 1. Plate Tectonics [oceanic evidences]<br>2. ESSRT: Geologically Important Radioactive Elements | HS-ESS1-2: Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.<br>HS-ESS2-1: Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features. |

### Scope and Sequence of Activities

| Introduction | Discovery | Notes | Revisit | Practice | Evaluate |
|---|---|---|---|---|---|
| Advancements in Technology | Investigation<br>Sea-floor Spreading | Keynote w/<br>Class Notes | Investigation<br>Wrap-up | Question<br>Clusters | Assessment<br>[10 question] |

### Supplemental Materials

### Resources and Links

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## Synthesizing the Driving Question

*Can we really comprehend geologic time?*

### Scope and Sequence of Activities

| Revisit the Driving Question | Learning Check-in | Model Time | Answering the Question | Investigation Recap |
|---|---|---|---|---|
| Driving Question Board Activity | Significant Events in Geologic Time | Humans and a Piece of the Pie | Whole-class Discussion | More to Explore |

### Resources and Links