**Earth Science Units Outline**

**2024-2025**

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| **Unit 1** | **Origin of the Universe** |
| **Learning Targets:** | **LT1A-** 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.  **SC1-**Analyze light spectra to understand cosmic origins.  **SC2-**Investigate and explain galactic motion and cosmic expansion.  **SC3-**Evaluate matter composition in the universe |
| **Assessment(s) for Evidence** | **LT1A-**  [**Assessment**](https://livedmpsk12ia-my.sharepoint.com/:w:/g/personal/alison_trimble_dmschools_org/Ee42D2ntGSVCgOSygmYM13IBjhHWZlNVQR0fsEZCgiFhCA?e=3Rli3Y) |
| **Resources/Links** |  |

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| **Unit 2** | **Stars** |
| **Learning Targets:** | **LT2A-** Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun’s core to release energy that eventually reaches Earth in the form of radiation.  **SC1-** Model the lifecycle of the sun  **SC2-** Use the Sun’s initial mass to predict its lifespan in comparison to other stars.  **SC3-** Explain how the Earth receives energy from the Sun, including the role of nuclear fusion processes in the Sun's core.  **LT2B-** Use a model (HR Diagram) to communicate how different elements are produced throughout the various stages in a star’s lifecycle.  **SC1-** Identify and communicate the relationships between the life cycle of the stars and the production of elements.  **SC2-** Explain how matter and energy are conserved during element production in stars.  **SC3-** Predict the actions of stellar processes based on its lifecycle stage. |
| **Assessment(s) for Evidence** | **LT2A-** Open Sci Ed Research Based Models from lessons 3 & 4. Both needed for AT  **LT2A & LT2B-** Star Life Cycle Comic Strip (2A Reassessment opportunity, 2B assessment) |
| **Resources/Links** |  |

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| **Unit 3** | **Orbital Motion** |
| **Learning Targets:** | **LT3A-** Predict and explain the motion of orbiting objects in the solar system using mathematical representation.  **SC1-** Apply Kepler’s laws of planetary motion to orbiting objects.  **SC2-** Apply Newton’s law of gravitational force to orbiting objects.  **SC3-** Use mathematical representations to predict motion of orbiting objects |
| **Assessment(s) for Evidence** | LT3A- [Canvas Quiz](https://drive.google.com/file/d/1D8qmski4NqZrFD5BDh3dwXsocl8mKwWo/view?usp=drive_link) |
| **Resources/Links** |  |

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| **Unit 4** | **Earth’s Formation** |
| **Learning Targets:** | **LT4A-** Construct an account of Earth’s formation and age using reasoning and evidence from ancient Earth materials, meteorites, and other  planetary surfaces.  **SC1-** Analyze and interpret evidence from ancient earth materials to account for Earth’s formation and age.  **SC2-** Evaluate meteorite and planetary surface data to explain key events and processes that shaped Earth’s early history.  **SC3-** Construct evidence-based accounts for Earth’s formation and age.  **LT4B-** Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface features  **SC1-** Investigate how water changes rocks through physical and chemical processes.  **SC2**-Describe how planetary surface features have changed over time based on evidence.  **SC3**-Explain water’s role in preserving and removing evidence of Earth’s age.  **LT4C-** Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.  Learning that shows evidence of progressing towards grade-level learning target:  **SC1**-Analyze interactions between Earth’s systems and life.  **SC2**-Evaluate evidence to describe the relationships and dependencies between Earth's systems and life.  **SC3**- Construct a claim using evidence to reason how life started on Earth. |
| **Assessment(s) for Evidence** | **LT4A-** Potential ET- Assessment Question 1: Two paleontologists have recently discovered two fossils. They determined that **fossil** **A lived during the Tertiary** time interval and **fossil B lived during the Cambrian** interval. Predict: Which fossil is older add if would you expect to have more complex features? ***Justify your prediction***  Potential Assessment Question 2: Create a Persuasive Statement: Use reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to account for Earth's formation and age. Your Task: 1) Inform the reader about the formation and age of Earth. 3) Use a minimum of 3 pieces of evidence to support. 4) Explain how the evidence supports the claim.  Potential Assessment Question 3: National Geographic Reading: From the reading, what evidence supports the age of earth?  **LT4B-** [HS-ESS2-5 Assessment - Investigating Erosivity - Google Docs](https://docs.google.com/document/d/1IluZkqaz2vQC77GYXSUc5blg5M4jT5EQOfPX5Ae1gJs/template/preview)  [HS-ESS2-5 Assessment - Can the Thailand cave ordeal occur in New York (NY) - Google Docs](https://docs.google.com/document/d/1j8Xfvw45JlYVo53PqvK4WNWMUML1PpAOk48c_-n4vAA/template/preview)  **LT4C-**[HS-ESS2-7 Assessment - What Caused the Cambrian Explosion? - Google Docs](https://docs.google.com/document/d/1ECyqhYo0bWexROst6svIonqCcwQX_MV6vNY1B-EwyZ8/template/preview)  [HS-ESS2-7 Assessment - Is there a relationship between fossilized cyanobacteria bubbles and simple seaweeds and the composition of Earth’s Atmosphere? (NY) - Google Docs](https://docs.google.com/document/d/1qRHsQRa9WHMaBhewRD4sEF16Ade7l4zHx6gGEkhnUCs/template/preview) |
| **Resources/Links** |  |

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| **Unit 5- (S2)** | **Plate Tectonics** |
| **Learning Targets:** | **LT5A-** 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.  **SC1-** Accurately identify and describe geological evidence that supports the movements of continental and oceanic crust  **SC2-** Interpret the evidence and explain the processes that lead to the formation, modification, and age of crustal rocks  **SC3-** Present a coherent explanation of how plate tectonics has affected the age and distribution of crustal rocks  **LT5B-** Develop a model to illustrate how Earth’s internal and surface processes form continental and ocean-floor features.  **SC1-** Use evidence to build a model representing key processes and features  **SC2-** Model communicates the relationship between land and ocean features and Earth's internal and crustal processes, highlighting how these  processes operate at varying rates and scales  **LT5C-** Develop a model based on evidence of Earth’s interior that shows how matter cycles in the process of thermal convection.  **SC1-** Develop a model based on evidence  **SC2-** Students describe the relationships between components in the mode |
| **Assessment(s) for Evidence** |  |
| **Resources/Links** |  |

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| **Unit 6** | **Carbon Cycle** |
| **Learning Targets:** | **LT6A-** Develop a model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.  **SC1-** Create a model with most critical components.  **SC2-** Describe the relationships between components within the model.  **SC3-** Use the model to predict the effects of changes in one part of the carbon cycle on the other part  **LT6B-** Evaluate a technological solution that reduces impacts of human activities on Earth’s systems.  **SC1-** Analyze and evaluate various technological solutions designed to reduce carbon emissions and their effectiveness in mitigating  impacts on the carbon cycle and Earth's systems.  **SC2-** Evaluate the broader environmental and economic impacts of implementing technological solutions for reducing carbon  emissions  **SC3-** Construct a well-reasoned argument, supported by evidence, about the effectiveness of a chosen technological solution for  reducing human impacts on Earth’s systems and make recommendations for its implementation |
| **Assessment(s) for Evidence** |  |
| **Resources/Links** |  |

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| **Unit 7** | **Natural Resources** |
| **Learning Targets:** | **LT7A-** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and  changes in climate influence human activity.  **SC1-** Identify and describe evidence to construct their claim.  **SC2-** Construct a claim that explains cause-and-effect relationships between environmental factors and features of human societies.  **SC3-** Use reasoning that connects and explains the evidence to support the claim.  **LT7B-** Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit  ratios to mitigate human impact on the environment.  **SC1-** Identify and describe potential design solutions and explain how it addresses the problem.  **SC2-** Compare design solutions  **SC3-** Form a conclusion for the “best’ design solution. |
| **Assessment(s) for Evidence** |  |
| **Resources/Links** |  |

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| **Unit 8** | **Earth’s Climate** |
| **Learning Targets:** | **LT8A-** Construct a claim that one change to Earth’s surface can create feedback that causes changes to other Earth systems.  **SC1-** Analyze geoscience data to identify and describe specific climate-related changes to Earth's surface and their initial effects on  Earth’s systems.  **SC2-**Construct a clear and detailed explanation of how climate-related surface changes create feedback loops that influence other Earth  systems, using evidence from data analysis.  **SC3-**Develop a well-supported claim about how a specific climate-related change to Earth's surface creates feedback that impacts other  Earth systems and justify this claim using data and evidence.  **LT8B-** Describe how variations in the flow of energy into and out of Earth’s systems result in changes in climate.  Learning that shows evidence of progressing towards grade-level learning target:  **SC1-** Describe and analyze how variations in the flow of energy into and out of Earth’s systems affect climate.  **SC2-** Construct a detailed explanation connecting specific variations in energy flow with observable changes in climate.  **Sc3-** Evaluate and interpret climate data and models to assess how variations in energy flow contribute to climate changes and their  potential impacts on Earth’s systems  **LT8C-** Analyze global climate models to forecast global or regional climate change and future impacts to Earth systems.  Learning that shows evidence of progressing towards grade-level learning target:  **SC1-** Explain what global climate models predict for future climate changes.  **SC2-** Apply model projections to predict how future climate changes will impact various Earth systems |
| **Assessment(s) for Evidence** |  |
| **Resources/Links** |  |