Centerville Abington Senior High School Curriculum Mapping
Earth and Space Science
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Earth and Space Science Overview

The Indiana Academic Standards specify the core, fundamental skills students should learn, master, and apply at grade level beginning in kindergarten and continuing through grade twelve. These academic standards serve as the basis to our curriculum in Centerville-Abington Community Schools but do not serve as curriculum alone. The Indiana Academic Standards are supported through grade-level, content-specific curriculum maps and resources. These curriculum maps and resources are aligned to the Indiana Academic Standards and provide the tools which are necessary to meet the needs of all learners. As a result, the Centerville-Abington Community Schools' curriculum maps are examined regularly and undergo periodic revisions.

This class provides a study of the earth's lithosphere, atmosphere, hydrosphere, and its celestial environment using supplemental materials and the textbook *Earth Science: Geology, The Environment & The Universe* by Glencoe/McGraw Hill (2017). This course emphasizes the study of energy at work in forming and modifying earth materials, landforms, and continents through geological time. Students have opportunities to gain an understanding of the history of the development of the earth and space sciences, to explore the uses of knowledge of the earth and its environment in various careers, and to cope with problems related to personal needs and social issues.

Textbook: Glencoe/McGraw Hill. (2017). *Earth Science: Geology, The Environment & The Universe.*

Unit 1 Theme Earth Structure and Maps	**Duration of Unit** 16 Class periods- 32 school days
Essential Question How do Earth scientists use mapping technologies to investigate and describe our world?	
End of Unit 1 Authentic Learning Task Students will individually create a topographic map using provided data from specific locations on earth. A rubric will be used to assess students' maps. Learning targets for this authentic learning task include the following: ● I can interpret the contour interval for maps ● I can use data to create an accurate representation of the topography of geographic locations ● I can describe the appearance of land using a topographic map Standards: 9-10.LST.3.1, HS-ESS2-2	

Pacing: Unit 1, Chapters 1-2
16 class periods - 32 school days

Indiana Academic Standards

9-10.LST2.3, HS-ESS2-1, HS-ESS2-2, HS-ESS2-3, HS-ESS2-5

Academic Vocabulary

astronomy, meteorology, geology, oceanography, environmental science, geosphere, atmosphere, hydrosphere, cryosphere, biosphere,scientific methods, hypothesis, independent variable, dependent variable, control, Le Systeme International d'Unites (SI), scientific notation, scientific model, scientific theory, scientific law, cartography, equator, latitude, longitude, prime meridian, international date line, Mercator projection, conic projection, gnomonic projection, topographic map, contour line, contour interval, geographic map, map legend, map scale, remote sensing, Landsat satellite, sonar, global positioning system, geographic information system

Key Concepts/Learning Targets

Chapter 1

- I can identify the dependent and independent variables of an experiment
- I can describe the difference between an experiment and an investigation
- I can describe the difference between mass and weight
- I can explain how units and scientific notation are used
- I can describe the relationship among Earth's systems
- I can list and describe Earth's systems
- I can explain why precise communication is crucial in scientific investigations
- I can determine when it is appropriate to use a graph or model
- I can explain the differences between scientific theories and scientific laws

Chapter 2

- I can describe the difference between latitude and longitude
- I can explain the importance of giving a city's complete coordinates when describing its location
- I can explain why there are different time zones in different geographic areas
- I can describe the similarities and differences between different map types

Question Stems

Chapter 1

- What are the dependent and independent variables of an experiment?
- What is the difference between an experiment and an investigation?
- What is the difference between mass and weight?
- How do you write 4,000,000,000 in scientific notation?
- How is the biosphere affected by the geosphere?
- How are each of Earth's spheres different?
- What is the best unit of measurement to use?
- How would you use a graph to represent this data?
- What is the difference between a scientific theory and a law?

Chapter 2

- What is the difference between latitude and longitude?
- Why is it important to give a city's complete coordinates when describing its location?
- Why are there different time zones in different geographic areas?
- What are some similarities and differences between different map types?
- Why are different maps used for different purposes?
- How is the gradient on a topographic map calculated?
- What are the different types of remote sensing?
- How are satellites and sonar used to map the surface of Earth and its oceans?

• I can explain why different maps are used for different purposes • I can explain how gradients on a topographic map are calculated • I can describe the different types of remote sensing • I can describe how satellites and sonar are used to map the surface of Earth and its oceans • I can explain the Global Positioning System and how it works • I can follow a multistep procedure for experiments. I can take measurements and perform technical tasks. • I can identify what tools or instruments I need for a procedure. I can analyze results of an experiment, including evidence and data to support my conclusion.	• What is the Global Positioning System and how does it work? • What is the purpose of this experiment? • What comes first? • What are the steps?
Resources/Activities • Measurement Skills Practice • Observations and Inferences Activity • Critical Thinking Mapping Practice • Unit Conversion Practice • Density Calculation Problems • Layers of Earth Critical Thinking Questions • Layers of Earth Model • Quizlet • Applying Practices Activity • Weather Classroom Video • What's Earth Science Got to do With it Videos	**Assessments** • Measurement Lab • Density PHET Lab • Chapter 1 Test • Chapter 2 Test • Topographic Map Profile

Unit 2 Theme	**Duration of Unit**
Rocks and Minerals	10 Class periods- 20 school days
Essential Question What is the significance of rocks and minerals?	

End of Unit 2 Authentic Learning Task

Students will work in pairs and use laboratory procedures to correctly identify the most prevalent rocks and minerals in the area, as well as describe the processes that formed each of them. Students will use a chart to describe the samples they identify. A checklist will be used to assess students' mastery. Learning targets for this authentic learning task include the following:

- I can use the following tests to identify minerals: luster, hardness, cleavage, streak and density.
- I can accurately calculate the density of specific minerals.
- I can describe the common uses of certain minerals
- I can describe what processes occur during the rock cycle and how it causes the rocks to change composition

Standards: 9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS2-3

Pacing: Unit 2 Chapters 3-6
10 Class periods - 20 school days

Indiana Academic Standards

9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS2-3, HSESS2-1, HS-ESS2-5

Academic Vocabulary

Crystalline structure, Glass, Evaporation, Plasma, Condensation, Sublimation, Mineral, Crystal, Luster, Hardness, Cleavage, Fracture, Streak, Specific gravity, Silicate, Tetrahedron, Ore, Gem, Lava, Igneous rock, Partial melting, Bowen's reaction series, Fractional crystallization, Intrusive rock, Extrusive rock, Basaltic rock, Granitic rock, Texture, Porphyritic texture, Vesicular texture, Pegmatite, Kimberlite, Sediment, Lithification, Cementation, Bedding, Graded bedding, Cross-bedding, Foliated, Nonfoliated, Regional metamorphism, Contact metamorphism, Hydrothermal metamorphism, Rock cycle

Key Concepts/Learning Targets

Chapter 3

- I can identify different states of matter on Earth.
- I can explain why matter exists in different states.
- I can explain how thermal energy relates to the changes in states of matter.

Chapter 4

- I can explain what makes a substance a mineral.
- I can describe how minerals form.
- I can describe how minerals are classified.
- I can identify the major mineral groups.
- I can illustrate the silicon-oxygen tetrahedron.
- I can explain how minerals are used.

Question Stems

Chapter 3

- How would you identify different states of matter on Earth?
- Why does matter exist in different states?
- How does thermal energy relate to the changes in the state of matter?

Chapter 4

- What makes a substance a mineral?
- How do minerals form?
- How are minerals classified?
- What characteristics are used to identify the major mineral groups?
- How do you illustrate the silicon-oxygen tetrahedron?
- How are minerals used?

Chapter 5 ● I can explain how igneous rocks form. ● I can describe the composition of magma. ● I can describe the factors that affect how rocks melt and crystallize. ● I can describe the different types and textures of igneous rock. ● I can explain how cooling rates affect the grain sizes of igneous rocks. ● I can explain some of the uses of igneous rocks. **Chapter 6** ● I can explain how sedimentary rocks are formed. ● I can describe the process of lithification. ● I can describe the main features of sedimentary rocks. ● I can describe the different types and causes of metamorphism. ● I can describe the different textures of metamorphic rock. ● I can explain the cause of mineral and compositional changes during metamorphism. ● I can classify rocks using the rock cycle. ● I can determine the central ideas of a text. I can determine the conclusions of a text. ● I can follow a multistep procedure for experiments. I can take measurements and perform technical tasks.	**Chapter 5** ● How do igneous rocks form? ● What is the composition of magma? ● What are some factors that affect how rocks melt and crystallize? ● What are the different types and textures of igneous rock? ● How does the cooling rate affect the grain sizes of igneous rocks? ● What are some of the uses of igneous rocks? ● What is the central idea of this text? **Chapter 6** ● How are sedimentary rocks formed? ● What is lithification? ● What are the main features of sedimentary rocks? ● What are the different types of metamorphism? ● What causes metamorphism? ● What are the different textures of metamorphic rock? ● What causes the mineral and compositional changes that occur during metamorphism? ● How would you classify rocks using the rock cycle? ● What is the purpose of this experiment? ● What comes first? ● What are the steps? ● What is the best unit of measurement to use?
Resources/Activities ● Mineral lab investigation ● Mineral usage Activity ● Igneous rock lab ● Metamorphic rock lab ● Sedimentary rock lab ● Rock cycle lab investigation ● Quizlet ● Applying Practices Activity ● Weather Classroom Video	**Assessments** ● Mineral Quiz ● Igneous Rock Quiz ● Sedimentary Rock Quiz ● Metamorphic Rock Quiz ● Chapter 3 and 4 Test ● Chapter 5 and 6 Test ● Daily Bellringer Questions

Unit 3 Theme The Dynamic Earth	**Duration of Unit** 15 Class periods- 30 school days

Essential Questions

Where does most geologic activity occur?
Why does most geologic activity occur at that location?

End of Unit 3 Authentic Learning Task

Students will work in pairs to create and use a model to demonstrate the different types of plate boundaries. Students will complete lab questions while they demonstrate the types of plate boundaries. A rubric will be used to assess students' mastery. Learning targets for this authentic learning task include the following:

- I can make a model to demonstrate a divergent plate boundary.
- I can make a model to demonstrate a convergent plate boundary.
- I can make a model to demonstrate a transform plate boundary.
- I can provide examples of locations where each type of plate boundary exists.
- I can explain what causes the type of plate boundary at the specified location.
- I can explain what landforms are present at each boundary location.

Standards: 9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS1-5, HS-ESS2-1, HS-ESS2-3

Pacing: Unit 3 Chapters 17-20
15 Class periods - 30 school days

Indiana Academic Standards

9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HSESS2-1, HS-ESS2-3

Academic Vocabulary

Continental drift, Pangea, Magnetometer, Magnetic Reversal, Paleomagnetism, Isochron, Seafloor spreading, Tectonic plate, Divergent boundary, Rift valley, Convergent boundary, Subduction, Transform boundary, Ridge push, Slab pull, Volcanism, Hot spot, Flood basalt, Fissure, Conduit, Vent, Crater, Caldera, Shield volcano, Cinder cone, Composite volcano, Viscosity, Tephra, Pyroclastic flow, Pluton, Batholith, Stock, Laccolith, Sill, Dike, stress, strain, elastic deformation, plastic deformation, fault, seismic wave, primary wave, secondary wave, focus, epicenter, seismometer, seismogram, Richter scale, Magnitude, Amplitude, Moment magnitude scale, Modified Mercalli scale, Soil liquefaction, Tsunami, Seismic gap, Topography, Isostacy, Root, Isostatic rebound, Orogeny, Compressive force, Uplifted mountain, Plateau, Fault-block mountain

Key Concepts/Learning Targets	**Question Stems**
Chapter 17	**Chapter 17**

- I can list the evidence that led Wegener to suggest that the Earth's continents have moved.
- I can explain how evidence of ancient climates supports the idea of continental drift.
- I can explain why continental drift was not accepted when it was first proposed.
- I can list the evidence that led to the discovery of seafloor spreading.
- I can explain the significance of magnetic patterns on the seafloor.
- I can explain the process of seafloor spreading.
- I can describe how the movement of Earth's tectonic plates results in many geologic features.
- I can describe the three types of plate boundaries and the features associated with each.
- I can describe the processes associated with subduction zones.
- I can explain the process of convection.
- I can describe how convection in the mantle is related to the movements of tectonic plates.
- I can describe the processes of ridge push and slab pull.

Chapter 18

- I can explain how plate tectonics influences the formation of volcanoes.
- I can describe the major zones of volcanism.
- I can label the parts of a volcano.
- I can explain how volcanic landforms differ.
- I can explain why magma type influences a volcano's explosivity.
- I can describe the role of pressure and dissolved gasses in volcanic eruptions.
- I can list the types of material ejected during volcanic eruptions.
- I can describe features that formed from solidified magma under Earth's surface.
- I can list the different types of intrusive rock bodies.

- What are the lines of evidence that led Wegener to suggest that the Earth's continents have moved?
- How does evidence of ancient climates support continental drift?
- Why was continental drift not accepted when it was first proposed?
- What evidence led to the discovery of seafloor spreading?
- What is the significance of magnetic patterns on the seafloor?
- How is the process of seafloor spreading explained?
- How does the movement of Earth's tectonic plates result in many geologic features?
- What are the three types of plate boundaries and the features associated with each?
- What are the processes associated with subduction zones?
- How is the process of convection explained?
- How is convection in the mantle related to the movements of tectonic plates?
- What are the processes of ridge push and slab pull?

Chapter 18

- How do plate tectonics influence the formation of volcanoes?
- What are the major zones of volcanism?
- What are the parts of a volcano?
- How do volcanic landforms differ?
- How does magma type influence a volcano's explosivity?
- What is the role of pressure and dissolved gasses in volcanic eruptions?
- What kinds of material are ejected by volcanic eruptions?
- How would you describe features that formed from solidified magma under Earth's surface?
- What are the different types of intrusive rock bodies?
- What geologic processes result in intrusive rocks that appear at Earth's surface?

Chapter 19

- How are stress and strain defined as they apply to rocks?
- What are the three types of movement of faults?
- What are the three types of seismic waves?
- How does a seismometer work?
- How have seismic waves been used to determine the structure and

- I can explain the geologic processes that result in intrusive rocks that appear at Earth's surface.

Chapter 19

- I can define the terms stress and strain when applying it to rocks.
- I can describe the three types of fault movement.
- I can describe the three types of seismic waves.
- I can explain how a seismometer works.
- I can explain how seismic waves have been used to determine the structure and composition of Earth's interior.
- I can describe earthquake magnitude and intensity and explain how they are measured.
- I can explain why data from at least three seismic stations is needed to locate an earthquake's epicenter.
- I can describe the location of Earth's seismic belts.
- I can describe the factors that affect the amount of damage caused by an earthquake.
- I can describe the factors considered during earthquake probability studies.
- I can explain how different types of structures are affected by earthquakes.

Chapter 20

- I can describe the elevation distribution of Earth's surface.
- I can define isostacy and explain how it pertains to Earth's mountains.
- I can describe the response of Earth's crust to the addition and removal of mass.
- I can define orogenic processes.
- I can describe the different types of mountains that form along convergent plate boundaries .
- I can explain how the Appalachian mountains formed.
- I can explain the processes associated with non-boundary mountains.
- I can explain how mountain ranges at ocean ridges form.
- I can explain the differences between uplifted and fault-block mountains.

composition of Earth's interior?

- What are earthquake magnitude and intensity and how are they measured?
- Why are data from at least three seismic stations needed to locate an earthquake's epicenter?
- Where are Earth's seismic belts?
- What factors affect the amount of damage caused by an earthquake?
- What are some of the factors considered in earthquake probability studies?
- How are different types of structures affected by earthquakes?

Chapter 20

- How can the elevation distribution of Earth's surface be described?
- What is isostacy and how does it pertain to Earth's mountains?
- How does Earth's crust respond to the addition and removal of mass?
- What are orogenic processes?
- How are the different types of mountains that form along convergent plate boundaries described?
- How did the Appalachian mountains form?
- What are the processes associated with non-boundary mountains?
- How are mountain ranges at ocean ridges formed?
- How do uplifted and fault-block mountains differ?
- What is the purpose of this experiment?
- What comes first?
- What are the steps?
- What is the best unit of measurement to use?
- Based on the context, what does the key terms or domain-specific mean?
- Based on the context, what does this symbol mean?

• I can use the context to determine the meaning of words. • I can use the context to determine the meaning of symbols. • I can determine the central ideas of a text. I can determine the conclusions of a text. • I can follow a multistep procedure for experiments. I can take measurements and perform technical tasks.	
Resources/Activities • Geolabs • Plate Tectonics Flip Book Activity • Plotting Volcanoes Activity •]USGS Volcano Hazards Interactive Simulation with Questions • Mercalli Scale Observations Activity • Deadliest Volcanoes Video • Tsunami Activity with Video Clips	**Assessments** • Chapter Tests • Section Quizzes • Daily Bellringer Questions • Laboratory Activity Questions • Exit tickets

Unit 4 Theme Geologic Time	**Duration of Unit** 6 Class periods- 12 school days
Essential Question How do scientists use several methods to learn about Earth's long history?	
End of Unit 4 Authentic Learning Task Students will individually create a geologic timeline using all the major geologic events from Earth's past. A rubric will be used to assess students' mastery. Learning targets for this authentic learning task include the following: • I can describe the major geologic events that have occurred throughout Earth's history. • I can put those events in order on a timeline. • I can include accurate images of each of the major geologic events. • I can explain how those events have impacted our world today. Standards: 9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS1-2, HS-ESS2-2, HS-ESS2-7	

Pacing: Unit 4 Chapters 21-23
6 Class periods - 12 school days

Indiana Academic Standards

9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS1-2, HS-ESS2-2, HS-ESS2-7

Academic Vocabulary

Geologic timescale, Eon, Precambrian, Era, Period, Epoch, Mass extinction, Uniformitarianism, Relative-age dating, Original horizontality, Superposition, Cross-cutting relationships, Principle of inclusions, Unconformity, Correlation, Key bed, Absolute-age dating, Radioactive decay, Radiometric dating, Half-life, Radiocarbon dating, Dendrochronology, Varve, Evolution, Original preservation, Altered hard part, Mineral replacement, Mold, Cast, Trace fossil, Index fossil, Zircon, Meteorite, Asteroid, Differentiation, Microcontinent, Craton, Precambrian shield, Canadian Shield, Laurentia, Cyanobacteria, Stromatolite, Banded-iron formation, Red bed, Amino acid, Prokaryote, Eukaryote, Ediacaran biota, Paleogeography, Passive margin, Transgression, Regression, Cambrian Explosion, Phytoplankton, Amniotic egg, Iridium, *Homo sapiens,* bipedal

Key Concepts/Learning Targets

Chapter 21

- I can explain why scientists need a geologic time scale.
- I can explain how eons, eras, periods, and epochs are classified.
- I can describe the groups of plants and animals that dominated the eras of Earth's history.
- I can define uniformitarianism and explain its importance to geology.
- I can describe the geologic principles used to interpret rock sequences and determine their relative ages.
- I can describe the different types of unconformities and explain how they differ.
- I can explain how scientists use correlations to understand the history of a region.
- I can describe the differences between absolute-age dating and relative-age dating.
- I can explain how radioactive elements are used to date rocks and other objects.
- I can explain how scientists can use certain non-radioactive materials to date geologic events.
- I can describe the methods by which fossils are preserved.
- I can explain how scientists use index fossils.
- I can explain how fossils are used to interpret Earth's physical and biological history.

Question Stems

Chapter 21

- Why do scientists need a geologic time scale?
- How are eons, eras, periods, and epochs defined?
- What are the groups of plants and animals that dominated eras of Earth's history?
- How is uniformitarianism defined and what is its importance to geology?
- What geologic principles are used to interpret rock sequences and determine relative ages?
- What are the different types of unconformities and how do they differ?
- How do scientists use correlations to understand the history of a region?
- What are the differences between absolute-age dating and relative-age dating?
- How are radioactive elements used to date rocks and other objects?
- How can scientists use certain non-radioactive materials to date geologic events?
- What are the methods by which fossils are preserved?
- How do scientists use index fossils?
- How are fossils used to interpret Earth's past physical and biological history?

Chapter 22

- What evidence exists that indicated Earth is 4.6 billion years old?

Chapter 22

- I can list the evidence which indicates Earth is 4.6 billion years old.
- I can describe the heat sources that were present on early Earth.
- I can summarize the process by which Earth differentiated.
- I can describe how Earth's crust and continents were formed.
- I can describe how the continents grew during the Precambrian.
- I can explain how Earth's atmosphere and oceans were formed.
- I can explain the cause of the increase in oxygen gas in the atmosphere.
- I can explain how scientists know that atmospheric oxygen existed during the Proterozoic.
- I can describe the importance of oxygen and water on early Earth.
- I can summarize the experimental evidence that shows how life might have begun on Earth.
- I can describe the difference between prokaryotes and eukaryotes.
- I can describe Earth's early multicellular organisms.

Chapter 23

- I can describe a passive margin.
- I can explain why transgressions and regressions indicate sea level changes.
- I can list the tectonic events that shaped Laurentia during the Paleozoic.
- I can summarize the changes in Paleozoic life-forms over that period of time.
- I can describe how the breakup of Pangea affected Earth's life-forms and paleogeography.
- I can describe how the mountains of western North America were formed.
- I can list the possible causes of the extinction of the non-avian dinosaurs and other Mesozoic life-forms.

- What were the heat sources of early Earth?
- How would you summarize the process by which Earth differentiated?
- How did Earth's crust and continents form?
- How did the continents grow during the Precambrian?
- How did Earth's atmosphere and oceans form?
- What was the cause for the increase in oxygen gas in the atmosphere?
- How do scientists know that atmospheric oxygen existed during the Proterozoic?
- What was the importance of oxygen and water on early Earth?
- How would you summarize the experimental evidence that shows how life might have begun on Earth?
- What is the difference between prokaryotes and eukaryotes?
- How are Earth's early multicellular organisms described?

Chapter 23

- What is a passive margin?
- How do transgressions and regressions indicate sea level changes?
- What tectonic events shaped Laurentia during the Paleozoic?
- How would you summarize the changes in Paleozoic life-forms?
- How did the breakup of Pangea affect Earth's life-forms and paleogeography?
- How did the mountains of western North America form?
- What are the possible causes of the extinction of the non-avian dinosaurs and other Mesozoic life-forms?
- What was the extent of glaciation during the Cenozoic?
- How would you describe the tectonic activity in North America during the Cenozoic?
- How did climate change affect life-forms during the Cenozoic?
- Based on the context, what does the key terms or domain-specific mean?
- What is the relationship between the concept of _____ and _____ in the text?
- What is the purpose of this experiment?
- What comes first?
- What are the steps?

• I can describe the extent of glaciation during the Cenozoic. • I can describe what the tectonic activity in North America was like during the Cenozoic. • I can explain how climate change affected life-forms during the Cenozoic. • I can analyze the relationship among concepts in a text. • I can use the context to determine the meaning of words. • I can use the context to determine the meaning of symbols.	
Resources/Activities • Geolab • Quizlet • Applying Practices Activity • Weather Classroom Video • Fossil Classification Activity • PHET Carbon Dating Simulation • Superposition Critical Thinking Questions • Relative Dating Critical Thinking Questions	**Assessments** • Chapter Tests • Section Quizzes • Exit Tickets • Daily Bellringer Questions

Unit 5 Theme Resources and the Environment	**Duration of Unit** 10 Class periods- 20 school days
Essential Question How do people and other organisms use Earth's resources for everyday living?	
End of Unit 5 Authentic Learning Task Students will work in pairs to develop a self-sustaining community when presented with specific resources. Students will be presented with a criteria of expectations for their self-sustaining community. A rubric will be used to assess students' mastery. Learning targets for this authentic learning task include the following: • I can describe a renewable and nonrenewable resource and explain how they are obtained. • I can develop a community in which 10,000 people can be fed, housed and provided with all the materials necessary to support them. • I can explain what ecological areas will have specific natural resources which are needed for the community. Standards: 9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS2-2, HS-ESS2-3, HS-ESS2-4, HS-ESS2-5, HS-ESS2-6, HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6	

Pacing: Unit 5 Chapters 24-26
10 Class periods- 20 school days

Indiana Academic Standards

9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS2-2, HS-ESS2-3, HS-ESS2-4, HS-ESS2-5, HS-ESS2-6, HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-5, HS-ESS3-6

Academic Vocabulary

Natural resource, Renewable resource, Sustainable yield, Nonrenewable resource, desertification, Aggregation, Bedrock, Ore, Tailings, Nitrogen-fixing bacteria, Pollutant, Hydrogen bond, Desalination, fuel, biomass fuel, hydrocarbon, peat, fossil fuel, photovoltaic cell, hydroelectric power, geothermal energy, nuclear fission, energy efficiency, cogeneration, sustainable energy, exponential growth, carrying capacity, density-independent factor, density-dependent factor, reclamation, deforestation. pesticide, bioremediation. photochemical smog, ozone hole, acid precipitation, point source, nonpoint source

Key Concepts/Learning Targets

Chapter 24

- I can explain what renewable and nonrenewable resources are.
- I can define sustainable yield.
- I can explain how and why resources are unevenly distributed on Earth.
- I can explain which materials from Earth's crust are considered to be natural resources.
- I can explain the importance of protecting Earth's land surface as a resource.
- I can explain why the atmosphere is a resource.
- I can illustrate the carbon and nitrogen cycles.
- I can list the natural sources of air pollution.
- I can explain why the properties of water are important for life on Earth.
- I can explain how water is distributed and used on Earth.
- I can explain ways humans can reduce the need for freshwater resources.

Chapter 25

- I can explain why the sun is the source of most of the energy

Question Stems

Chapter 24

- What are renewable and nonrenewable resources?
- What is a sustainable yield?
- How are resources unevenly distributed on Earth and how is this explained?
- Which materials from Earth's crust are considered to be natural resources?
- Why is the need to protect Earth's land surface as a resource important?
- How is the atmosphere a resource?
- How are the carbon and nitrogen cycles illustrated?
- What are natural sources of air pollution?
- Why are the properties of water important for life on Earth?
- How is water distributed and used on Earth?
- In what ways can humans reduce the need for freshwater resources?

Chapter 25

- Why is the sun the source of most of the energy on earth?
- What materials are used as fuels?
- How does coal form?

on earth.
- I can list materials used as fuels.
- I can describe how coal forms.
- I can list several alternative energy resources.
- I can explain how the sun's energy can be harnessed.
- I can explain how water, wind, nuclear, and thermal energy can be used to generate electricity.
- I can describe why nuclear energy might be controversial.
- I can describe how energy resources can be conserved.
- I can explain how increasing energy efficiency may help to preserve fossil fuels.
- I can describe how energy can be used more efficiently.

Chapter 26

- I can describe the typical pattern of population growth of organisms.
- I can explain what happens to populations once they reach carrying capacity.
- I can list environmental factors that affect the growth of a population.
- I can describe how mineral extraction can impact the environment.
- I can describe some of the environmental issues created by agriculture and forestry and possible solutions for those issues.
- I can explain how urban development affects soil and water.
- I can describe the relationship between the greenhouse effect and global warming.
- I can list the sequence of reactions that occur as CFCs cause ozone depletion.
- I can explain the causes and effects of acid precipitation.
- I can explain the ways that water can be conserved.
- I can describe the types and sources of water pollution.
- I can explain how water pollution can be reduced.
- I can analyze the relationship among concepts in a text.
- I can use the context to determine the meaning of words.
- I can use the context to determine the meaning of symbols.

- What are several alternative energy resources?
- How can the sun's energy be harnessed?
- How can water, wind, nuclear, and thermal energy be used to generate electricity?
- Why might nuclear energy be controversial?
- How can energy resources be conserved?
- How can increasing energy efficiency help preserve fossil fuels?
- How can energy be used more efficiently?

Chapter 26

- What is the typical pattern of population growth of organisms?
- What happens to populations once they reach carrying capacity?
- What environmental factors affect population growth?
- How can mineral extraction impact the environment?
- What are some of the environmental issues created by agriculture and forestry and possible solutions?
- How does urban development affect soil and water?
- What is the relationship between the greenhouse effect and global warming?
- What is the sequence of reactions that occur as CFCs cause ozone depletion?
- What are the causes and effects of acid precipitation?
- In what ways can water be conserved?
- What are the types and sources of water pollution?
- How can water pollution be reduced?
- What is the relationship between the concept of _____ and _____ in the text?
- What is the purpose of this experiment?
- What comes first?
- What are the steps?
- How can you summarize the information?
- How can you summarize the table or chart?

• I can translate quantitative or technical information from words into a visual like a table or chart.	
Resources/Activities • Geolab- Water Usage • Quizlet • Applying Practices Activity • Weather Classroom Video • Greenhouse Gasses Climate Change Activity • Global Warming Video • Home Movie • Drinking Water Activity	**Assessments** • Chapter Tests • Section Quizzes • Exit Tickets • Daily Bellringer Questions

Unit 6 Theme Surface Processes on Earth	**Duration of Unit** 7 Class periods- 14 school days
Essential Question How does weathering and erosion cause Earth's surface to change?	
End of Unit 6 Authentic Learning Task Students will individually create a soil profile model and identify the different properties of soils in each layer. Students will color and describe these different properties on their profile. A checklist will be used to assess students' mastery. Learning targets for this authentic learning task include the following: • I can describe the different types of soil horizons within a soil profile • I can explain the effects of the exposure of rock to different elements such as wind, water, and rain as it relates to the development of soils • I can describe the textural and nutrient differences between each layer of the soil profile Standards: 9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS5-1, HS-ESS5-2, HS-ESS5-3	

Pacing: Unit 6, Chapters 7-10 12 class periods/ 24 school days
Indiana Academic Standards 9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS4-1, HS-ESS4-2, HS-ESS4-3, HS-ESS4-4, HS-ESS4-5, HS-ESS4-6, HS-ESS5-3, HS-ESS5-6

Academic Vocabulary

Weathering, Mechanical weathering, Frost wedging, Exfoliation, Chemical weathering, Oxidation, Erosion, Deposition, Rill erosion, Gully erosion, Soil, lResidual soil, Transported soil, Soil profile, Soil horizon, Mass movement, Creep, Mudflow, Landslide, Slump, Avalanche, Deflation, Abrasion, Ventifact, Dune, Loess, Glacier, Valley glacier, Continental glacier, Cirque, Moraine, Outwash plain, Drumlin, Esker, Kame, Kettle, Runoff, Watershed, Divide, Suspension, Bed load, Discharge, Flood, Floodplain, Stream channel, Stream bank, Base level, Meander, Delta, Rejuvenation, Lake, Eutrophication, Wetland, Infiltration, Zone of saturation, Water table, Zone of aeration, Permeability, Aquifer, Aquiclude, Spring, Hot spring, Geyser, Cave, Sinkhole, Karst topography, Stalactite, Stalagmite, Well, Drawdown, Recharge, Artesian well

Key Concepts/Learning Targets

Chapter 7

- I can explain how mechanical and chemical weathering differ.
- I can describe the different factors that affect mechanical and chemical weathering.
- I can list the variables that affect the rate of weathering.
- I can describe the relationship between gravity and the agents of erosion.
- I can describe the features that are characteristic of the different types of erosion.
- I can explain how living and non-living things impact the processes of weathering and erosion.
- I can describe the process of soil formation.
- I can label the different soil horizons in a soil profile.
- I can describe the factors that affect soil formation.

Chapter 8

- I can describe the relationship between gravity and mass movements.
- I can list the factors that affect mass movements.
- I can list and describe the different types of mass movements.
- I can explain how mass movements affect people.
- I can describe the conditions that contribute to the likelihood that an area will experience wind erosion.
- I can list the features that are characteristic of wind erosion and deposition.

Question Stems

Chapter 7

- How do mechanical and chemical weathering differ?
- What are the different factors that affect mechanical and chemical weathering?
- What variables affect the rate of weathering?
- What is the relationship of gravity to all agents of erosion?
- What features are characteristic of the different types of erosion?
- How do living and non-living things impact the processes of weathering and erosion?
- How does soil form?
- What are the different soil horizons in a soil profile?
- What factors affect soil formation?

Chapter 8

- What is the relationship between gravity and mass movements?
- What factors affect mass movements?
- What are the different types of mass movements and how are they described?
- How do mass movements affect people?
- What are the conditions that contribute to the likelihood that an area will experience wind erosion?
- What features are characteristic of wind erosion and deposition?
- How do dunes form and migrate?
- How do glaciers form?
- What are the similarities and differences between valley glaciers and continental glaciers?
- How do glaciers modify landscapes?

- I can describe how dunes form and migrate.
- I can explain how glaciers form.
- I can list the similarities and differences between valley glaciers and continental glaciers.
- I can explain how glaciers modify landscapes.
- I can list the features that are characteristic of glacial erosion and deposition.

Chapter 9

- I can explain how surface water can move weathered materials.
- I can describe how a stream carries its load.
- I can explain how a floodplain develops.
- I can describe the physical features that are characteristic of stream development.
- I can describe the relationship between meanders and stream flow.
- I can explain the process of rejuvenation in stream development.
- I can describe how freshwater lakes and wetlands form.
- I can describe the process of eutrophication.
- I can explain the effects of human activities on lake development.

Chapter 10

- I can relate groundwater storage and underground movement to the water cycle.
- I can explain how aquifers and aquicludes are related.
- I can explain how the components of aquifers are related to the presence of springs.
- I can describe how groundwater dissolves and deposits rocks and minerals.
- I can describe the process of cave formation.
- I can describe the features that are characteristic of karst topography.
- I can explain the process of extracting groundwater from aquifers.
- I can describe the major problems that threaten groundwater

- What features are characteristic of glacial erosion and deposition?

Chapter 9

- How can surface water move weathered materials?
- How does a stream carry its load?
- How does a floodplain develop?
- What physical features are characteristic of stream development?
- What is the relationship between meanders and stream flow?
- How is the process of rejuvenation in stream development explained?
- How do freshwater lakes and wetlands form?
- How is the process of eutrophication described?
- What are the effects of human activity on lake development?

Chapter 10

- How do groundwater storage and underground movement relate to the water cycle?
- How are aquifers and aquicludes related?
- How are the components of aquifers related to the presence of springs?
- How does groundwater dissolve and deposit rocks and minerals?
- How do caves form?
- What features are characteristic of karst topography?
- How is groundwater withdrawn from aquifers?
- What are the major problems that threaten groundwater supplies?
- What is the relationship between the concept of _____ and _____ in the text?
- What is the purpose of this experiment?
- What comes first?
- What are the steps?
- How can you summarize the information?
- How can you summarize the table or chart?

supplies. ● I can analyze the relationship among concepts in a text. ● I can use the context to determine the meaning of words. ● I can use the context to determine the meaning of symbols. ● I can translate quantitative or technical information from words into a visual like a table or chart.	
Resources/Activities ● Critical Thinking ● Applying Practices Activity ● Weather Classroom Video ● What's Earth Science Got to do With it Videos ● Mini Lab: Modeling Erosion ● Erosion and Soils Critical Thinking Questions ● Data Analysis Lab: Interpret the Data Soil Texture ● Geo Lab: Model Mineral Weathering ● Data Analysis Lab: Interpret the Data Glaciers ● Mini Lab: Model Glacial Deposition ● Geo Lab- Mapping: Map a Landslide ● Problem-Solving Lab: Streams ● Mini Lab: Model Lake Formation ● Geo Lab: Predict the Velocity of a Stream ● Problem Solving Lab: Make a Topographic Profile ● Mini Lab: Model an Artesian Well ● Geo Lab: Mapping- Tracking Groundwater Pollution	**Assessments** ● Labs ● Chapter Tests ● Quizlet ● Nearpods ● Exit Tickets ● Daily Bellringer Questions

Unit 7 Theme The Atmosphere	**Duration of Unit** 11 Class periods- 22 school days
Essential Question How does the composition, structure, and properties of Earth's atmosphere form the basis of Earth's weather and climate?	
End of Unit 7 Authentic Learning Task Students will work in groups to create a watershed model and observe how different types and amounts of precipitation affect the rates of erosion.	

Students will also observe the effects of precipitation on stream channel direction and shape. Students will complete a lab report to demonstrate these processes. A checklist will be used to assess students' mastery. Learning targets for this authentic learning task include the following:

- I can describe the different types of precipitation and the types of clouds that cause each
- I can explain what happens to the precipitation after it hits the ground
- I can describe how precipitation affects the rate of weathering on rocks and soils

Standards: 9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS4-2, HS-ESS4-3, HS-ESS4-5, HS-ESS5-3, HS-ESS5-6

Pacing: Unit 7, Chapters 11-14
11 class periods - 22 school days

Indiana Academic Standards

9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS4-1, HS-ESS4-2, HS-ESS4-3, HS-ESS4-4, HS-ESS4-5, HS-ESS4-6, HS-ESS5-3, HS-ESS5-6

Academic Vocabulary

Troposphere, Stratosphere, Mesosphere, Thermosphere, Exosphere, Radiation, Conduction, Convection, Temperature inversion, Humidity, Saturation, Relative humidity, Dew point, Latent heat, Condensation nucleus, Orographic lifting, Cumulus, Stratus, Cirrus, Precipitation, Coalescence, Weather, Climate, Air mass, Source region, Coriolis effect, Polar Easterlies, Prevailing Westerlies, Trade winds, Jet stream, Front, Thermometer, Barometer, Anemometer, Hygrometer, Radiosonde, Doppler effect, Station model, Isobar, Isotherm, Digital forecast, Analog forecast, Air-mass thunderstorm, Mountain thunderstorm, Sea-breeze thunderstorm, Frontal thunderstorm, Stepped leader, Return stroke, Supercell, Downburst, Tornado, Enhanced Fujita Tornado Damage Scale, Tropical cyclone, Eye, Eyewall, Saffir-Simpson Hurricane Wind Scale, Storm surge, Drought, Heat wave, Cold wave, Windchill indexClimatology, Normal, Tropics, Temperature zones, Polar zones, Koppen classification system, Microclimate, Heat island, Ice age, Season, El Nino, Maunder minimum, Greenhouse effect, Global warming

Key Concepts/Learning Targets

Chapter 11

- I can describe the gas and particle composition of the atmosphere.
- I can list the five layers of the atmosphere.
- I can explain how energy is transferred in the atmosphere.
- I can describe the three main properties of the atmosphere and how they interact.
- I can explain why the atmospheric properties change with changes in altitude.
- I can explain the difference between stable and unstable air.

Question Stems

Chapter 11

- What is the gas and particle composition of the atmosphere?
- What are the five layers of the atmosphere?
- How is energy transferred in the atmosphere?
- What are the three main properties of the atmosphere and how do they interact?
- Why do atmospheric properties change with changes in altitude?
- What is the difference between stable and unstable air?
- How do low, middle, high and vertical development clouds differ?

- I can describe the difference between low, middle, high and vertical development clouds.
- I can explain how precipitation forms.

Chapter 12

- I can explain the difference between weather and climate.
- I can explain why the imbalances in the heating of Earth's surface create weather.
- I can describe how air masses form.
- I can list the five types of air masses.
- I can describe the similarities and differences between the three major wind systems.
- I can list the four types of fronts.
- I can describe how high and low pressure systems differ.
- I can explain why accurate weather data is important.
- I can list some of the instruments used to collect weather data from Earth's surface.
- I can describe the strengths and weaknesses of weather radar and weather satellites.
- I can list the information present on a basic surface weather chart.
- I can describe the difference between digital and analog forecasting.
- I can list the problems associated with long-term forecasts.

Chapter 13

- I can explain how thunderstorms form.
- I can list the different types of thunderstorms.
- I can describe the life cycle of a thunderstorm.
- I can explain why some thunderstorms are more severe than others.
- I can list the dangers of severe weather.
- I can describe how tornadoes form.
- I can describe how tropical cyclone form.
- I can describe the life cycle of a tropical cyclone.
- I can list the dangers associated with hurricanes.
- I can describe the problems associated with recurring weather patterns.

- How does precipitation form?

Chapter 12

- What is the difference between weather and climate?
- How do imbalances in the heating of Earth's surface create weather?
- How do air masses form?
- What are the five types of air masses?
- What are the similarities and differences between the three major wind systems?
- What are the four types of fronts?
- How do high and low pressure systems differ?
- Why is accurate weather data important?
- What are some of the instruments used to collect weather data from Earth's surface?
- What are the strengths and weaknesses of weather radar and weather satellites?
- What information is on a basic surface weather chart?
- How do digital and analog forecasting differ?
- What are the problems associated with long-term forecasts?

Chapter 13

- How do thunderstorms form?
- What are the different types of thunderstorms?
- What is the life cycle of a thunderstorm?
- Why are some thunderstorms more severe than others?
- What are the dangers of severe weather?
- How do tornadoes form?
- How do tropical cyclones form?
- What is the life cycle of a tropical cyclone?
- What are the dangers associated with hurricanes?
- What are the problems associated with recurring weather patterns?
- How do heat waves and cold waves differ?

Chapter 14

- What are limits associated with the use of normals?
- Why do climates vary?
- How do temperatures in different regions on Earth differ?
- What are the criteria used to classify climates?
- How are different climates described?

- I can describe the difference between heat waves and cold waves.

Chapter 14

- I can describe the limits associated with the use of normals.
- I can explain why climates vary.
- I can explain why there are different temperatures in different regions on Earth.
- I can list the criteria used to classify climates.
- I can describe different climates.
- I can define a microclimate.
- I can explain the difference between long-term and short-term climatic changes.
- I can list the natural causes of climate change.
- I can explain why climate changes occur.
- I can define the term greenhouse effect.
- I can explain what global warming is.
- I can describe how humans impact the climate.
- I can analyze the relationship among concepts in a text.
- I can use the context to determine the meaning of words.
- I can use the context to determine the meaning of symbols.
- I can translate quantitative or technical information from words into a visual like a table or chart.

- What are microclimates?
- What is the difference between long-term and short-term climatic changes?
- What are natural causes of climate change?
- Why do climatic changes occur?
- What is the greenhouse effect?
- What is global warming?
- How do humans impact climate?
- What is the relationship between the concept of _____ and _____ in the text?
- What is the purpose of this experiment?
- What comes first?
- What are the steps?
- How can you summarize the information?
- How can you summarize the table or chart?

Resources/Activities

- Critical Thinking
- Applying Practices Activity
- Weather Classroom Video
- What's Earth Science Got to do With it Videos
- Problem Solving Lab: Interpret the graph Relative Humidity
- Mini Lab: Investigating Dew Formation
- Cloud Diagramming and Labeling
- Geo Lab- Interpret Pressure-Temperature Relationships
- Mini Lab: Compare the Angles of Sunlight to Earth
- Problem-Solving Lab: Interpret a Scientific Illustration
- Geo Lab- Mapping: Interpret a Weather Map
- Mini Lab: Model Flood Conditions

Assessments

- Labs
- Chapter Tests
- Quizlet
- Nearpods
- Exit Tickets
- Daily Bellringer Questions

• Data Analysis Lab: Interpret the Table- Heat Waves • Geo Lab: Track a Tropical Cyclone • Data Analysis Lab: Monthly Temperatures • Geo Lab- Design Your Own: Identify a Microclimate	

Unit 8 Theme Beyond Earth	**Duration of Unit** 13 Class periods- 26 school days

Essential Question

How does the Sun, Earth and Moon form a dynamic system that influences all life on Earth?

End of Unit 8 Authentic Learning Task

Students will individually explore a planet of their choice by researching all of its characteristics. Students will create a multimedia presentation of their findings about their planet and deliver a presentation in front of their peers. A rubric will be used to assess students' presentations. Learning targets for this authentic learning task include the following:

- I can explain what the atmosphere would be like if we were to live on this planet.
- I can describe the composition and surface characteristics of the planet.
- I can list what supplies would be needed if we were to live on the planet I researched.
- I will be able to accurately describe the dimensions of my planet relative to Earth and other planets within our solar system.

Standards: 9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS1-5, HS-ESS2-2, HS-ESS-3

Pacing: Unit 8 Chapters 27-30
13 Class periods - 26 school days

Indiana Academic Standards

9-10LST2.2, 9-10LST2.3, 9-10LST3.1, 9-10LST3.2, 9-10.LST4.1, HS-ESS1-1, HS-ESS1-2, HS-ESS1-3, HS-ESS1-4, HS-ESS1-5, HS-ESS2-1, HS-ESS2-2, HS-ESS2-3, HS-ESS2-4, HS-ESS2-5

Academic Vocabulary

Electromagnetic spectrum, Refracting telescope, Reflecting telescope, Interferometry, Albedo, Highland, Mare, Impact crater, Ejecta, Ray, Rille, Regolith, Ecliptic plane, Solstice, Equinox, Synchronous rotation, Solar eclipse, Perigee, Apogee, Lunar eclipse, Planetesimal, Retrograde motion, Ellipse, Astronomical unit, Eccentricity, Terrestrial planet, Scarp, Gas giant planet, Liquid metallic hydrogen, Belt, Zone, Dwarf planet, Meteoroid, Meteor, Meteorite, Kuiper belt, Comet, Meteor shower, Photosphere, CHromosphere, Corona, Solar wind, Sunspot, Solar flare, Prominence, Fusion, Fission, Constellation, Binary star, Parsec, Parallax, Apparent magnitude, Absolute magnitude, Luminosity, Hertzprung-Russell diagram,

Main sequence, Nebula, Protostar, Neutron star, Pulsar, Supernova, Black hole, Variable star, RR Lyrae variable, Cepheid variable, Halo, Population I star, Population II star, Spiral density wave, Dark matter, Supercluster, Hubble constant, Active galactic nucleus, Radio galaxy, Quasar, Cosmology, Big Bang Theory, Cosmic background radiation

Key Concepts/Learning Targets	Question Stems
Chapter 27 ● I can describe electromagnetic radiation. ● I can explain how telescopes work. ● I can describe how space exploration helps scientists learn more about the universe. ● I can explain the history of lunar exploration. ● I can describe lunar properties and structures. ● I can label the features of the moon. ● I can explain the theory of the Moon's origin and formation. ● I can explain the relative positions and motions of the Sun, Earth, and Moon. ● I can diagram the phases of the moon. ● I can explain the difference between a solstice and an equinox. ● I can explain what causes the eclipses of the Sun and Moon. **Chapter 28** ● I can explain how the solar system formed. ● I can describe some of the early concepts of the structure of the solar system. ● I can explain how our current knowledge of the solar system has developed. ● I can describe the relationship between gravity and the motions of the objects in the solar system. ● I can describe how the characteristics of the inner planets are similar. ● I can list some of the space probes used to explore the solar system. ● I can explain how the terrestrial planets are different from each other. ● How do the gas giants differ from each other? ● I can list the major moons.	**Chapter 27** ● What is electromagnetic radiation? ● How do telescopes work? ● How does space exploration help scientists learn more about the universe? ● What is the history of lunar exploration? ● How are lunar properties and structures described? ● What are the features of the moon? ● What is the theory of the Moon's origin and formation? ● What are the relative positions and motions of the Sun, Earth, and Moon? ● What are the phases of the moon? ● What is the difference between a solstice and an equinox? ● How are eclipses of the Sun and Moon explained? **Chapter 28** ● How did the solar system form? ● What are some of the early concepts of the structure of the solar system? ● How has our current knowledge of the solar system developed? ● What is the relationship between gravity and the motions of the objects in the solar system? ● How are the characteristics of the inner planets similar? ● What are some of the space probes used to explore the solar system? ● How are the terrestrial planets different from each other? ● How do the gas giants differ from each other? ● What are the major moons? ● How do moons and rings form? ● How does the composition of the gas planets and the composition of the sun compare? ● What are the differences between planets and dwarf planets? ● What are the oldest members of the solar system?

- I can describe how moons and rings form.
- I can compare the composition of the gas planets and the composition of the sun.
- I can describe the differences between the planets and dwarf planets.
- I can list the oldest members of the solar system.
- I can accurately describe meteoroids, meteors, and meteorites.
- I can explain the structure of a comet.

Chapter 29

- I can label the layers and features of the sun.
- I can explain the process of energy production in the sun.
- I can define the three types of spectra
- I can describe how to measure the distances between stars.
- I can describe the difference between brightness and luminosity.
- I can list the properties used to classify stars.
- I can explain the relationship between mass and a star's evolution.
- I can describe the features of massive and regular star life cycles.
- I can explain how the universe is affected by the life cycles of stars.

Chapter 30

- I can describe the size and shape of our galaxy.
- I can describe the different kinds of variable stars.
- I can explain where the different types of stars in a galaxy are located.
- I can explain how astronomers classify galaxies.
- I can explain how galaxies are organized into clusters and superclusters.
- I can describe the expansion of the universe.
- I can describe the different models of the universe.
- I can explain how expansion relates to each of the models.
- I can explain the importance of the Hubble constant.
- I can analyze the relationship among concepts in a text.

- How are meteoroids, meteors, and meteorites described?
- What is the structure of a comet?

Chapter 29

- What are the layers and features of the sun?
- How is the process of energy production in the sun explained?
- How are the three types of spectra defined?
- How are the distances between stars measured?
- What is the difference between brightness and luminosity?
- What are the properties used to classify stars?
- What is the relationship between mass and a star's evolution?
- What are the features of massive and regular star life cycles?
- How is the universe affected by the life cycles of stars?

Chapter 30

- What is the size and shape of our galaxy?
- What are the different kinds of variable stars?
- Where are the different types of stars in a galaxy located?
- How do astronomers classify galaxies?
- How are galaxies organized into clusters and superclusters?
- How is the expansion of the universe described?
- What are the different models of the universe?
- How is expansion related to each of the models?
- What is the importance of the Hubble constant?
- What is the relationship between the concept of _____ and _____ in the text?
- What is the purpose of this experiment?
- What comes first?
- What are the steps?
- How can you summarize the information?
- How can you summarize the table or chart?

• I can use the context to determine the meaning of words. • I can use the context to determine the meaning of symbols. • I can translate quantitative or technical information from words into a visual like a table or chart.	
Resources/Activities • Geolab- Mapping: Determine Relative Ages of Lunar Features • Problem Solving Lab • Lunar Phases Simulation with Oreos • MiniLab- Predict the Sun's Summer Solstice Position • Quizlet • Applying Practices Activity • Weather Classroom Video • What's Earth Science Got to Do With It (video) • Problem Solving Lab- Kepler's Laws • Geolab- Design your own: Model the Solar System • Lab- How Far To the Stars • HR Diagram Lab- Plotting the Stars • Geolab: Identify Stellar Spectral Lines • Mini Lab: Model Expansion • Geolab: Classify Galaxies	**Assessments** • Chapter Tests • Section Quizzes • Exit Tickets • Daily Bellringer Questions

Indiana Academic Standards Addressed and Assessed Each Term
Earth and Space Science
(A=assessed; I=introduced; P=practiced; R=reviewed)
(Green=high priority; Yellow=moderate priority; Blue=low priority)

Standard	Standard Statement	Term 1	Term 2	Term 3	Term 4
Earth's Place in the Universe					
HS-ESS1-1	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 in the form of radiation.			I	P

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.	I		P	R, A
HS-ESS1-3	Communicate scientific ideas about the way stars, over their life cycle, produce elements.			I	P, A
HS-ESS1-4	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.			I	P, A
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.			I, P, A	R, A
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.	I		P	R, A
Earth's Systems					
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.		I, P, A	R	
HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.	I	P,A	R	
HS-ESS2-3	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.		I	P,A,R	
HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	I	P,A	R	
HS-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.	I	P,A	R	
HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	I	P,A	R	

HS-ESS2-7	Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.	I	P	P,A	
HS-ESS2-8	Construct an explanation of how heat (energy) and water (matter) move throughout the oceans causing patterns in weather and climate.	I	P,A	R	
HS-ESS2-9	Construct an explanation for how energy from the Sun drives atmospheric processes and how atmospheric currents transport matter and transfer energy.	I	P,A	P,A,R	R
Human Interaction with Earth's Systems					
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.	I	P,A	P,A	R
HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.	I	P,A	P,A	R
HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity	I	P,A	P,A	R
HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	I	P,A	P,A	R
HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.	I	P,A	R	
HS-ESS3-6	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.	I	P,A	P,A, R	
Literacy in Science and Technical Subjects					
9-10.LST.2.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	I	P, A	P,A	R

9-10.LST.2.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate, objective summary of the text.	I, P	P, A	P	P
9-10.LST.2.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	I, P	P, A	P, A	P, A, R
9-10.LST.3.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.	I	PA	P	P
9-10.LST.3.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	I, P	P, A	P, A	P, A
9-10.LST.3.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	I, P, A	P, A	P, A	P, A
9-10.LST.4.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	I	P, A	P	P
9-10.LST.4.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	I, P	P	P	P
9-10.LST.4.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	I, P	P	P	P
9-10.LST.5.1	Write arguments focused on discipline-specific content.	I, P			

9-10.LST.5.2	Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.	I, P	P, A	P, A	P, A
9-10.LST.6.1	Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach, focusing on addressing what is most significant for a specific purpose and audience; and edit to produce and strengthen writing that is clear and coherent.	I, P	P	P	P
9-10.LST.6.2	Use technology to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	I, P	P	P	P
9-10.LST.7.1	Conduct short as well as more sustained research assignments and tasks to answer a question (including a self-generated question), test a hypothesis, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	I, P	P	P	P
9-10.LST.7.2	Gather relevant information from multiple authoritative sources, using advanced searches effectively; annotate sources; assess the usefulness of each source in answering the research question; synthesize and integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation (e.g., APA or CSE).	I, P	P	P	P