

# Unit: Planet Earth

Content Area: **Science**  
Course(s): **Integrated Science 6**  
Time Period: **2 marking periods**  
Length: **12 weeks**  
Status: **Published**

## Unit Overview

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Construct explanations about Earth's natural resources, the rock and water cycles, rock layers, fossils, geologic time, plate tectonics, and natural hazards using varied time scales.

## Transfer

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Students will be able to independently use their learning to:

- Describe how Earth's systems have changed in different ways.
- Understand how dynamic Earth is by observing the world and its phenomena around you to learn how one change affects another.

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For more information, read the following article by Grant Wiggins.

[http://www.authenticeducation.org/ae\\_bigideas/article.lasso?artid=60](http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60)

## Meaning

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## Understandings

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Students will understand...

the changes taking place in Earth's systems.

Earth's surface, its processes, and natural resources.

the ways rock layers help explain Earth's history.

natural hazards and how scientists and engineers mitigate the risks when they occur.

## **Essential Questions**

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How does energy move matter in Earth's four major systems?

How does Earth's surface change through time?

How did scientists develop the theory of plate tectonics?

How does the rock cycle model the movement of Earth's materials and energy?

How is all of Earth's water recycled?

Why are there different natural resources in different parts of Earth?

How do scientists discover Earth's history when examining rock strata?

How do scientists know what happened during Earth's 4.6 billion-year history?

How can people predict and plan for volcanic eruptions and earthquakes?

How do scientists know where mass wasting, tsunamis, or floods will happen?

## **Application of Knowledge and Skill**

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### **Students will know...**

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Students will know...

the changes taking place in Earth's systems.

Earth's surface, its processes, and natural resources.

the ways rock layers help explain Earth's history.

natural hazards and how scientists and engineers mitigate the risks when they occur.

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### **Students will be skilled at...**

Students will be skilled at...

Obtaining information using various texts, text features (e.g. headings, table of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question.

Developing a model to represent patterns in the natural world.

Making observations from several sources to construct an evidence-based account for natural phenomena.

Using evidence (e.g. measurements, observations patterns) to construct or support an explanation or design.

Making observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.

Analyzing and interpret data to make sense of phenomena using logical reasoning.

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### **Academic Vocabulary**

#### **Lesson 1-**

Crust  
Mantle  
Core  
Conduction  
Density  
Convection  
Radiation

#### **Lesson 2-**

Weathering  
Erosion  
Deposition  
Uplift  
Uniformitarianism

#### **Lesson 4-**

Igneous rock  
Sedimentary rock  
Metamorphic rock  
Crystal  
Mineral  
Intrusive rock  
Extrusive rock  
Rock cycle

#### **Lesson 5-**

Water cycle  
Evaporation  
Transpiration  
Condensation

#### **Lesson 7-**

Relative dating  
Absolute dating  
Law of superposition  
Principle of lateral continuity  
Law of cross-cutting relationships  
Law of fossil succession  
Index fossil

#### **Lesson 8-**

Mass extinction  
Geologic time scale  
Glacial period  
Interglacial period

<b>Lesson 3-</b>	Precipitation	<b>Lesson 9-</b>
Hypothesis	Runoff	Natural hazard
Continental drift	Infiltration	Precursor events
Fault	Ground water	Frequency
Seafloor spreading	<b>Lesson 6-</b>	Magnitude
Criteria	Natural resource	Mitigate
Constraints	Renewable resource	<b>Lesson 10-</b>
Scientific theory	Nonrenewable resource	Mass wasting
Plate tectonics	Sustainable	tsunami
Subduction	Petroleum	
	Geothermal energy	
	Soil	
	Ore	

## Learning Goal 1

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Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

SCI.MS-ESS2-1	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

## Target 1

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Lesson 1- Identify Earth's systems and explore how the flow of energy causes changes to matter within those systems through the process of convection.

## Learning Goal 2

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Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

SCI.MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well

they meet the criteria and constraints of the problem.

SCI.MS-ETS1-4

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

SCI.MS-ETS1-1

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

## **Target 1**

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Lesson 2- Explore the scale of phenomena in Earth's systems by observing rate and size.

## **Learning Goal 3**

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Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions

SCI.MS-ESS2-3

Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

SCI.MS-ETS1-2

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

SCI.MS-ETS1-1

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

SCI.MS-ETS1-4

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

## **Target 1**

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Lesson 3- Investigate continental drift using fossils, rock types, and mountain ranges.

## **Target 2**

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Lesson 4- Differentiate rocks based on their characteristics.

## **Learning Goal 4**

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Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and

the force of gravity.

SCI.MS-ESS2-4	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

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### **Target 1**

Lesson 5- Identify places water can be found on Earth and discover ways water moves.

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### **Learning Goal 5**

Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

SCI.MS-ESS3-1	Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

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### **Target 1**

Lesson 6- Explore the availability and use of renewable and nonrenewable resources.

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### **Learning Goal 6**

Construct an argument supported by evidence for how increases in human population and per-capita

consumption of natural resources impact Earth's systems

SCI.MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

## **Target 1**

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Lesson 6- Explore the availability and use of renewable and nonrenewable resources.

## **Learning Goal 7**

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Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

SCI.MS-ESS1-4	Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.
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## **Target 2**

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Lesson 8- Differentiate between geologic time periods.

## **Learning Goal 8**

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Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects

SCI.MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
SCI.MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

### **Target 1**

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Lesson 9- Analyze data to determine the locations of volcanoes and earthquakes. Explore how bridge design can help mitigate the risks caused by earthquakes.

### **Target 2**

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Lesson 10- Using a model, explain the relationship between slope angle, materials, and precipitation as they relate to both flooding and mass wasting.

### **Formative Assessment and Performance Opportunities**

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- Lesson Game
- Interactive Tutorial
- Interactive Student Notebook
- Vocabulary Cards
- Class Participation
- Performance Assessments

### **Summative Assessment**

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LinkIt! Common Assessment

NGSS- Designed Lesson Assessment: Energy in Earth's Systems

NGSS- Designed Lesson Assessment: Scales of Change on Earth's Surface

NGSS- Designed Lesson Assessment: Earth's Tectonic Plates

NGSS- Designed Lesson Assessment: The Rock Cycle

NGSS- Designed Lesson Assessment: The Water Cycle

NGSS- Designed Lesson Assessment: Earth's Natural Resources



NGSS- Designed Lesson Assessment: Investigating Rock Strata

NGSS- Designed Lesson Assessment: Reconstructing Earth's History

NGSS- Designed Lesson Assessment: Volcanic Eruptions and Earthquakes

NGSS- Designed Lesson Assessment: Mass Wasting, Tsunamis and Floods

## **Accommodations/Modifications**

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### **Deeper Coverage (Advanced Learners)**

- Students can investigate the topic by conducting further research and writing an explanation.
- Have students suggest alternative explanations that are supported by the available evidence.
- Use additional rock samples. (Lesson 4)
- Play against partner groups rather than whole class (Lesson 6)
- Identify local earthquakes. (Lesson 9)

### **English Language Learners**

- Pre-teach science vocabulary.
- Print presentation slides.
- Allow students to use pictures.
- Use students' background knowledge.
- Work with a reading partner.
- Use text audio.

### **Students with Special Needs**

- Use graphic organizers.
- Assign students specific roles.
- Use a smaller rock sample. (Lesson 4)
- Scaffold game play (Lesson 6)
- Place students in mixed ability pairs

## Unit Resources

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TCI Online Manual/ Materials

Vocabulary Cards

TCI Kit

Student chromebooks

## 21st Century Life and Careers

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CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP5.1	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people,

organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP10.1	Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

## Interdisciplinary Connections

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LA.W.6.1.A	Introduce claim(s) and organize the reasons and evidence clearly.
LA.W.6.1.B	Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.
LA.W.6.2.B	Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.
LA.W.6.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
LA.W.6.7	Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
LA.W.6.8	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.
LA.W.6.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
LA.RL.6.4	Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of a specific word choice on

meaning and tone.

MA.6.G.A

Solve real-world and mathematical problems involving area, surface area, and volume.

MA.6.EE.C.9

Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

MA.6.NS.C.5

Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

MA.6.RP.A.1

Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

MA.6.SP.A.1

Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.

MA.8.EE.A.4

Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.