

Wright City Science Curriculum

(4th Grade)

Grade	4th Grade
Unit of Study	Earth's Systems
Length of Unit	30 mins per day
Sample Essential Questions	Sample Corresponding Big Ideas
- What can patterns in rock formations and fossils tell us about the Earth's history? - How do layers of rock provide evidence of changes in a landscape over time?	ESS1.C: The History of Planet Earth Local, regional, and global patterns of rock formations reveal changes over time due to Earth forces such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (C.1)
- How does the environment influence the life that exists within it? . - In what ways is the Earth's surface constantly changing? - How do living and non-living elements of the Earth interact to shape the landscape?	ESS2.A: Earth Materials and Systems Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into s
- Why is the Earth's geological activity (earthquakes, volcanoes) not randomly distributed? - What stories can maps tell us about the hidden structures of our planet? - How does the location of a continent or ocean influence its physical features?	Interactions The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (B.1)
- If we cannot prevent natural hazards, how can we live safely alongside them? - What is the distinction between a natural process and a natural hazard?	ESS3.B: Natural Hazards A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (A.1)

How can human innovation and engineering reduce the destructive power of nature?	
- What are the criteria for a structure to be safe during a simulation? - How does limiting the resources provided force us to be more creative with stability? - Why is it necessary to test a prototype multiple times throughout the building process? - How do we use failures to build better structures/models?	ETS1.A: Defining and Delimiting Engineering Problems - Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (A.1) ETS1.B: Developing Possible Solutions - Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (B.1) - At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (B.1) - Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (C.1) ETS1.C: Optimizing the Design Solution - Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (C.1)

Missouri Learning Standards	
Priority Standards	Supporting Standards
4.ESS1.C.1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.	4.ESS2.A.1 Plan and conduct scientific investigations or simulations to provide evidence how natural processes (e.g. weathering and erosion) shape Earth's surfaces. 4.ESS2.B.1 Analyze and interpret data from maps to describe patterns of Earth's features
4.E.SS3.A.1 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans	4.ETS1.A.1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost 4.ETS1.B.1 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem 4.ETS1.C.1 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Unit 1 Sequence			
MLS	Topic(s)	Learning Targets	Academic Vocabulary
4.ESS1.C.1	Rock formations, fossils, landscapes and layers	I can identify patterns in rock formations and fossil layers. I can use evidence from fossils to explain what an environment was like long ago (e.g., finding ocean shell fossils in a desert). I can explain how landscapes change over time using clues hidden in rock layers. I can order rock layers from oldest to newest based on their position (oldest at the bottom, newest at the top).	fossil rock Layer (strata) landscape evidence pattern sediment erosion
4.E.SS3.A.1	Earth's natural processes and their impact on human lives	I can identify natural Earth processes that impact human lives and property (e.g., floods, earthquakes, volcanic eruptions, landslides). I can brainstorm (generate) multiple solutions to protect people and buildings from natural hazards. I can compare different engineering solutions to see which one works best to reduce damage.	natural earth process / hazard impact generate compare solution mitigation / prevention
4.ETS1.A.1, 4.ETS1.B.1, 4.ETS1.C.1	Engineering Design	I can define a design problem by identifying the criteria (what it must do) and constraints (limits like time or money). I can brainstorm multiple solutions and compare them to see which one works best. I can carry out a fair test to find "failure points" in my model. I can use data from my tests to improve my design.	design constraint failure points

MLS	Learning Activities	
4.ESS1.C.1	Rock cycle with crayons	Can Do ▾

4.ESS1.C.1 4.E.SS3.A.1	Modeling Canyons, Erosion, and Weathering	Can Do ▾
4.ESS1.C.1	Rock Detective Lab	Can Do ▾
4.ESS1.C.1	Earth's Layer activity	Can Do ▾
4.E.SS3.A.1 4.ETS1.A.1, 4.ETS1.B.1, 4.ETS1.C.1	Engineering design solution to reduce impacts of earthquakes on structures	Must Do ▾
		Option L... ▾
		Option L... ▾
		Option L... ▾
		Option L... ▾

Assessments		
MLS	Description or Location	Rubric/Location
4.E.SS3.A.1 4.ETS1.A.1, 4.ETS1.B.1, 4.ETS1.C.1	Engineering design solution to reduce impacts of earthquakes on structures	engineer design solution rubric

Additional Resources	
●	Unit 3 Teacher Slides
●	Student Guided Notes
●	Materials