HS. History of the Earth

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A Performance Expectations HS.ESS1.HE

1 Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. HS.ESS1.5

2 Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history. HS.ESS1.6

3 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. HS.ESS2.1

B Science and Engineering Practices HS.HE.SEP

1 Developing and Using Models HS.HE.SEP.1

a Develop a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-ESS2-1) HS.HE.SEP.1A

2 Constructing Explanations and Designing Solutions HS.HE.SEP.2

a Apply scientific reasoning to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion. (HS-ESS1-6) HS.HE.SEP.2A

3 Engaging in Argument from Evidence HS.HE.SEP.3

a Evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-ESS1- 5) HS.HE.SEP.3A

4 Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena HS.HE.SEP.4

a A scientific theory is a substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment and the science community validates each theory before it is accepted. If new evidence is discovered that the theory does not accommodate, the theory is generally modified in light of this new evidence. (HS-ESS1- 6) HS.HE.SEP.4A

b Models, mechanisms, and explanations collectively serve as tools in the development of a scientific theory. (HS-ESS1-6) HS.HE.SEP.4B

Disciplinary Core Ideas HS.HE.DCI

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1 ESS1.C: The History of Planet Earth HS.HE.DCI.ESS1.C

a Continental rocks, which can be older than 4 billion years, are generally much older than the rocks of the ocean floor, which are less than 200 million years old. (HS-ESS1-5) HS.HE.DCI.ESS1.C.1

b Although active geologic processes, such as plate tectonics and erosion, have destroyed or altered most of the very early rock record on Earth, other objects in the solar system, such as lunar rocks, asteroids, and meteorites, have changed little over billions of years. Studying these objects can provide information about Earth's formation and early history. (HS-ESS1-6) HS.HE.DCI.ESS1.C.2

2 ESS2.A: Earth Materials and Systems HS.HE.DCI.ESS2.A

a Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. (HS-ESS2-1) (Note: This Disciplinary Core Idea is also addressed by HS-ESS2-2) HS.HE.DCI.ESS2.A.1

3 ESS2.B: Plate Tectonics and Large-Scale System Interactions HS.HE.DCI.ESS2.B

a Plate tectonics is the unifying theory that explains the past and current movements of the rocks at Earth's surface and provides a framework for understanding its geologic history. (ESS2.B Grade 8 GBE) (secondary to HS-ESS1-5),(HS-ESS2-1) HS.HE.DCI.ESS2.B.1

b Plate movements are responsible for most continental and ocean-floor features and for the distribution of most rocks and minerals within Earth's crust. (ESS2.B Grade 8 GBE) (HS-ESS2-1) HS.HE.DCI.ESS2.B.2

4 PS1.C: Nuclear Processes HS.HE.DCI.PS1.C

a (NYSED) Spontaneous radioactive decay follows a characteristic exponential decay law allowing an element's half-life to be used for radiometric dating of rocks and other materials. (secondary to HS-ESS1- 5),(secondary to HS-ESS1-6) HS.HE.DCI.PS1.C.1

D Crosscutting Concepts HS.HE.CC

1 Patterns HS.HE.CC.1

a Empirical evidence is needed to identify patterns. (HS-ESS1-5) HS.HE.CC.1A

2 Stability and Change HS.HE.CC.2

a Much of science deals with constructing explanations of how things change and how they remain stable. (HS-ESS1-6) HS.HE.CC.2A

b Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. (HSESS2-1) HS.HE.CC.2B