

# Earth Science: Grades 9, 10, 11, 12

Adopted 2018

## History of Earth

**ES-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. [ES-ESS1-5](#)

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**ES-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. [ES-ESS1-6](#)

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**ES-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. [ES-ESS2-1](#)

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**ES1-ETS1-1.** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. [ES1-ETS1-1](#)

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## Earth's Systems

**ES-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. [ES-ESS2-2](#)

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**ES-ESS2-3.** Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection. [ES-ESS2-3](#)

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**ES-ESS2-5.** Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. [ES-ESS2-5](#)

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**ES-ESS2-6.** Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. [ES-ESS2-6](#)

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**ES-ESS2-7.** Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. [ES-ESS2-7](#)

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**ES2-ETS1-1.** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. [ES2-ETS1-1](#)

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**ES2-ETS1-3.** Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. [ES2-ETS1-3](#)

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## Human Sustainability

**ES-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. [ES-ESS3-1](#)

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**ES-ESS3-2.** Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. [ES-ESS3-2](#)

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**ES-ESS3-3.** Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity. [ES-ESS3-3](#)

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**ES-ESS3-4.** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. [ES-ESS3-4](#)

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**ES-ESS3-6.** Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. [ES-ESS3-6](#)

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**ES3-ETS1-1.** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. [ES3-ETS1-1](#)

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**ES3-ETS1-2.** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. [ES3-ETS1-2](#)

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**ES3-ETS1-4.** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. [ES3-ETS1-4](#)

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## Weather and Climate

**ES-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. [ES-ESS2-4](#)

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**ES-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's systems. [ES-ESS3-5](#)

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**ES4-ETS1-3.** Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. [ES4-ETS1-3](#)