

MS-ESS2-1 Earth's Systems

California Science Test—Item Content Specifications

# MS-ESS2-1 Earth's Systems

Students who demonstrate understanding can:

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

[Clarification Statement: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth’s materials.] [*Assessment Boundary: Assessment does not include the identification and naming of minerals.*]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Developing and Using Models  Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.  Develop and use a model to describe phenomena. | ESS2.A: Earth’s Materials and Systems   1. All Earth processes are the result of energy flowing and matter cycling within and among the planet’s systems. This energy is derived from the sun and Earth’s hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth’s materials and living organisms. | Stability and Change  Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. |

## Assessment Targets

Assessment targets describe the focal knowledge, skills, and abilities for a given three-dimensional Performance Expectation. Please refer to the Introduction for a complete description of assessment targets.

### Science and Engineering Subpractice(s)

Please refer to appendix A for a complete list of Science and Engineering Practices (SEP) subpractices. Note that the list in this section is not exhaustive.

2.1 Ability to develop models

2.2 Ability to use models

### Science and Engineering Subpractice Assessment Targets

Please refer to appendix A for a complete list of SEP subpractice assessment targets. Note that the list in this section is not exhaustive.

2.1.1 Ability to determine components of a scientific event, system, or design solution

2.1.2 Ability to determine the relationships among multiple components of a scientific event, system, or design solution

2.1.3 Ability to determine scope, scale, and grain-size of models, as appropriate for their intended use

2.1.4 Ability to represent mechanisms, relationships, and connections to illustrate, explain, or predict a scientific event

2.2.1 Ability to use models to identify concepts and relationships represented in the models

2.2.2 Ability to use models to generate explanations and predictions about a scientific phenomenon

### Disciplinary Core Idea Assessment Targets

#### ESS2.A.5

* Identify the three main types of rocks (i.e., igneous, sedimentary, and metamorphic) based on their formation processes
* Identify the types of earth materials that can be found in different locations
* Describe that any type of rock can be changed into any other type of rock through different processes involving physical and/or chemical changes to the original rock
* Identify and describe the processes involved in the cycling of earth materials (the rock cycle), such as melting, crystallization, deformation, weathering, and sedimentation
* Identify and describe the sources of energy that drive the processes in the rock cycle (the Sun and Earth’s hot interior)
* Describe the temporal and spatial scales over which the processes in the rock cycle operate

### Crosscutting Concept Assessment Target(s)

CCC7 Construct explanations of stability and change in natural or designed systems by examining the changes over time and processes at different scales, including the atomic scale

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides both a description of a phenomenon that involves the cycling of earth materials and a list of relevant and irrelevant components, labels, or other representations to model the phenomenon:

* Identifies the appropriate components, labels, or other representations to develop a model of the phenomenon that includes the flow(s) or source(s) of energy driving the process(es) (2.1.1, ESS2.A.5, and CCC7)

Task provides both an incomplete model of a phenomenon that involves the cycling of earth materials and a list of relevant and irrelevant components, labels, or other representations to model the phenomenon:

* Identifies the appropriate components, labels, or other representations to complete the model of the phenomenon that includes the flow(s) or source(s) of energy driving the process(es) (2.1.1, ESS2.A.5, and CCC7)

Task provides both a description of a phenomenon that involves the cycling of earth materials and a list of components representing the relative spatial or temporal scales over which the processes involved occur:

* Selects the components with the appropriate relative scales (2.1.2, ESS2.A.5, and CCC7)

Task provides an incomplete model of a process involved in the cycling of earth materials:

* Selects the labels and/or representations to represent mechanisms and behaviors underlying the process (2.1.3, ESS2.A.5, and CCC7)

Task provides a model that illustrates the cycling of earth materials:

* Uses the model to identify evidence for relationships represented among different components of the system (2.2.1, ESS2.A.5, and CCC7)
* Identifies the explanation that a provided model attempts to convey (2.2.2, ESS2.A.5, and CCC7)
* Uses the model to make a prediction (2.2.2, ESS2.A.5, and CCC7)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Models of surface processes that include the Sun as a source of energy
* A model (or simulation) that predicts the cycling of matter over different temporal scales
* Earth’s hot interior provides energy to drive processes producing metamorphic and igneous rocks
* The changes in texture and composition of one type of rock (e.g., sedimentary or igneous) as it changes into a different type of rock (e.g., metamorphic or sedimentary)

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Minerals and rocks are the same thing.
* Rocks do not change.
* Rocks were formed where they are found.
* Weathering and erosion are the same thing.
* Wind and water cannot wear away rock.
* All processes in the rock cycle occur at the same rate and/or quickly or slowly.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-ESS2-1 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-ESS2-1 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ESS2-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)

The *2016 Science Framework for California Public Schools Kindergarten through Grade 12*

Appendix 1: Progression of the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in Kindergarten through Grade 12 <https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix1.pdf>

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