

MS-ESS3-1 Earth and Human Activity

California Science Test—Item Content Specifications

# MS-ESS3-1 Earth and Human Activity

Students who demonstrate understanding can:

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.

[Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).]

Continue to the next page for the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Constructing Explanations and Designing Solutions  Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.  Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students’ own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. | ESS3.A: Natural Resources   1. Humans depend on Earth’s land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. | Cause and Effect  Cause and effect relationships may be used to predict phenomena in natural or designed systems.  Connections to Engineering, Technology, and Applications of Science  Influence of Science, Engineering, and Technology on Society and the Natural World  All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. |

## Assessment Targets

Assessment targets describe the focal knowledge, skills, and abilities for a given three-dimensional Performance Expectation. Please refer to the Introduction (hyperlink to section on explanation of assessment targets) 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.

6.1 Ability to construct explanations of phenomena

### 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.

6.1.1 Ability to construct quantitative and/or qualitative explanations of observed relationships based on valid and reliable evidence

6.1.2 Ability to apply scientific concepts, principles, theories, and big ideas to construct an explanation of a real-world phenomenon

6.1.3 Ability to use models and representations in scientific explanations

### Disciplinary Core Idea Assessment Targets

#### ESS3.A.3

* Attribute the uneven distribution of Earth’s nonrenewable resources to past and present geoscience processes
* Identify geoscience processes, such as plate movements and weathering/deposition, which result in the formation of Earth’s nonrenewable resources
* Define nonrenewable resources as resources that are produced very slowly relative to a time period of interest or only in specific circumstances that occur rarely (including just once in Earth’s past)
* Describe technologies that enable extraction of nonrenewable resources
* Describe trends in nonrenewable resource extraction in terms of rate of usage and finite availability

### Crosscutting Concept Assessment Target(s)

CCC2 Use cause and effect relationships to predict phenomena in natural or designed systems

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides a map of plate boundaries and the global distribution of a nonrenewable Earth resource:

* Makes a claim that attributes the distribution of the resource to past/current geoscience processes (6.1.1, ESS3.A.3, and CCC2)
* Describes the evidence that supports the claim (6.1.1, ESS3.A.3, and CCC2)
* Provides reasoning that links the evidence to the claim (6.1.1, ESS3.A.3, and CCC2)
* Develops a model of plate movements to explain how the distribution of the resource resulted from the plate movements (6.1.3, ESS3.A.3, and CCC2)

Task provides a claim that attributes the global distribution of a nonrenewable Earth resource to past/current geoscience process(es):

* Uses scientific concepts (e.g., force), principles (e.g., crosscutting relationships), theories (e.g., plate tectonics), and big ideas (e.g., energy) to explain how the evidence supports the claim (6.1.2, ESS3.A.3, and CCC2)

Task provides a map of plate boundaries and the global distribution of a nonrenewable Earth resource in conjunction with a model of plate tectonics:

* Uses the model to construct an explanation for how the distribution of the resource resulted from the plate movements (6.1.3, ESS3.A.3, and CCC2)

## California Environmental Principles and Concepts

* EP1: The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.
* EP2: The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Distribution, geologic history, and formation of available resources:
  + Arable soils or soil formations
  + Fossil fuels
  + Freshwater aquifers
  + Hardwood forests
* Geologic history and formation of nonrenewable resources

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Resources are equally distributed across regions of similar visual characteristics.
* Human activity does not have a significant impact on nonrenewable resource availability.
* All resource extraction by humans is unsustainable.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-ESS3-1 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-ESS3-1 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ESS3-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)

California Environmental Principles and Concepts <http://californiaeei.org/abouteei/epc/>

California Education and the Environment Initiative <http://californiaeei.org/>

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>

Appendix 2: Connections to California Environmental Principles and Concepts <https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix2.pdf>

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