

MS-LS2-3 Ecosystems: Interactions, Energy, and Dynamics

California Science Test—Item Content Specifications

# MS-LS2-3 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

[Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [*Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.*]

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 |
| --- | --- | --- |
| Developing and Using ModelsModeling 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 a model to describe phenomena. | LS2.B: Cycle of Matter and Energy Transfer in Ecosystems2. Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. | Energy and MatterThe transfer of energy can be tracked as energy flows through a natural system.Connections to Nature of ScienceScientific Knowledge Assumes an Order and Consistency in Natural SystemsScience assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. |

## 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

### 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

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

### Disciplinary Core Idea Assessment Targets

#### LS2.B.2

* Identify producers, consumers, and decomposers in an ecosystem
* Identify the nonliving parts of an ecosystem that are necessary for the organisms in the ecosystem
* Identify the source(s) of energy for an ecosystem
* Describe the flow of energy through an ecosystem
* Describe the flow and cycling of matter through an ecosystem

### Crosscutting Concept Assessment Target(s)

CCC5 Identify that the transfer of energy can be tracked as energy flows through a designed or natural system

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides information on the organisms in an ecosystem:

* Arranges the organisms into a valid food web with arrows showing the correct relationships between organisms (2.1.1, LS2.B.2, and CCC5)

Task provides an incomplete model of a biomass pyramid/energy pyramid/other representation:

* Completes the model (2.1.1, LS2.B.2, and CCC5)
* Describes the change in energy between trophic levels (2.1.1, LS2.B.2, and CCC5)
* Explains why energy is lost between trophic levels (2.1.1, LS2.B.2, and CCC5)

Task provides a brief description of each organism in a food web and an incomplete model of the food web:

* Indicates the correct relationships between the organisms (2.1.3, LS2.B.2, and CCC5)

## 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.
* EP3: Natural systems proceed through cycles that humans depend upon, benefit from, and can alter.
* EP4: The exchange of matter between natural systems and human societies affects the long-term functioning of both.
* EP5: Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Energy transfers using food chains or food webs in a terrestrial or aquatic ecosystem
* Biomass or ecological pyramid in a terrestrial or aquatic ecosystem
* Movement and energy transfers using a biomass or ecological pyramid in a terrestrial or aquatic ecosystem
* Geochemical cycles between biotic and abiotic factors in an ecosystem

## Common Misconceptions

Note that the list in this section is not exhaustive.

* The arrows in food chains and webs point to the organism being consumed.
* All of the energy from one trophic level is transferred to the next trophic level.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-LS2-3 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-LS2-3 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-LS2-3%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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