

MS-LS1-5 From Molecules to Organisms: Structures and Processes

California Science Test—Item Content Specifications

# MS-LS1-5 From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

[Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.] [*Assessment Boundary: Assessment does not include genetic mechanisms, gene regulation, or biochemical 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 |
| --- | --- | --- |
| Constructing Explanations and Designing SolutionsConstructing 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 knowledge, 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. | LS1.B: Growth and Development of Organisms1. Genetic factors as well as local conditions affect the growth of the adult plant.
 | Cause and EffectPhenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. |

## 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.

6.1 Ability to construct explanations of phenomena

6.2 Ability to evaluate 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

### 6.2.2 Ability to use data to support or refute an explanation of a phenomenon Disciplinary Core Idea Assessment Targets

#### LS1.B.6

* Identify that both environmental and genetic factors influence the growth of organisms
* Use evidence and reasoning to construct a scientific explanation supporting that both environmental and genetic factors influence the growth of organisms
* Identify and describe environmental factors (including the availability of light, space, and water, as well as the size of the habitat) that influence growth of organisms
* Identify and describe genetic factors that influence growth of organisms
* Measure or evaluate data measuring changes in the growth of organisms as specific environmental and genetic factors change
* Connect evidence to support the explanation that the growth of organisms is influenced by multiple environmental and genetic factors

### Crosscutting Concept Assessment Target(s)

CCC2 Identify that phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task presents data showing a species growing under different environmental conditions over time:

* Makes a quantitative and/or qualitative conclusion regarding the relationships between dependent and independent variables (6.1.1, LS1.B.6, and CCC2)
* Constructs an explanation of factors that influence growth (6.1.1, LS1.B.6, and CCC2)

Task presents data showing different growth rates in the individuals or groups of individuals of a single species:

* Uses scientific concepts and big ideas to explain how the evidence supports a conclusion that environmental factors can or cannot influence growth in a species (6.1.2, LS1.B.6, and CCC2)
* Uses scientific concepts and big ideas to explain how the evidence can or cannot support a conclusion about genetic factors in a species (6.1.2, LS1.B.6, and CCC2)

Task presents a model showing the impact of environmental factors alone, genetic factors alone, and/or a combination of environmental and genetic factors on the growth of organisms:

* Uses the model to explain the role of environmental factors on growth (6.1.3, LS1.B.6, and CCC2)
* Uses the model to explain the role of genetic factors on growth (6.1.3, LS1.B.6, and CCC2)
* Uses the model to explain the combined effect of environmental factors and genetic factors on growth (6.1.3, LS1.B.6, and CCC2)

Task presents data illustrating differences in the growth in organisms of a species under different conditions:

* Uses the data to support an explanation of differences in growth due to environmental and/or genetic factors (6.2.2, LS1.B.6, and CCC2)

## California Environmental Principles and Concepts

* EP2: The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.
* EP4: The exchange of matter between natural systems and human societies affects the long-term functioning of both.

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Availability of resources (water, nutrients, space, etc.)
* Change in annual temperature
* Impact of disease on organisms
* Competition among animal species
* Influence of genetic and epigenetic factors on the development of organisms

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Genetics will always control the growth of organisms, regardless of environmental conditions.
* Plant growth is not controlled by genetics.
* Only animals inherit genes from their parents.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-LS1-5 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-LS1-5 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-LS1-5%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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