

MS-LS4-5 Biological Evolution: Unity and Diversity

California Science Test—Item Content Specifications

# MS-LS4-5 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

[Clarification Statement: Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries.]

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 |
| --- | --- | --- |
| Obtaining, Evaluating, and Communicating Information  Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.  Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. | LS4.B: Natural Selection  2. In *artificial* selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. | Cause and Effect  Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.  Connections to Engineering, Technology, and Applications of Science  Interdependence of Science, Engineering, and Technology  Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.  Connections to Nature of Science  Science Addresses Questions About the Natural and Material World  Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. |

## 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.

8.1 Ability to comprehend and evaluate text in terms of its validity, reliability, and sources

### 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.

8.1.1 Ability to obtain relevant information through conducting searches in print and online sources and evaluate the reliability of the obtained information

8.1.2 Ability to recognize, interpret, and critique key ideas in scientific and engineering text, including a mix of words, symbols, tables, diagrams, and graphs

8.1.3 Ability to summarize information from a single source and/or combine and synthesize information from multiple sources to address a question or solve a problem

### Disciplinary Core Idea Assessment Targets

#### LS4.B.2

* Identify the effect of selective breeding on a species
* Identify the purpose and effect of genetic engineering
* Identify the purpose and effect of gene therapy
* Describe that humans employ artificial selection to both promote positive features in organisms and remove negative ones
* Describe the possible social effects of using technology to influence genetic transmission in species
* Gather and synthesize information about the technologies used in genetic engineering

### 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 provides data showing changes in frequency of certain traits in a population over time due to artificial selection or genetic manipulation by humans:

* Identifies the change over time (8.1.1, LS4.B.2, and CCC2)
* Explains how artificial selection or genetic manipulation can change the frequency of traits (8.1.1, LS4.B.2, and CCC2)

Task provides research materials for students to look up examples of genetic modification in organisms:

* Identifies relevant information on the types of genetic modifications presented (8.1.2, LS4.B.2, and CCC2)
* Describes different methods of genetic manipulation and the possible outcomes (8.1.2, LS4.B.2, and CCC2)

Task provides a claim and a data set on genetic manipulation by humans in a particular species:

* Summarizes the data and indicates trends (8.1.3, LS4.B.2, and CCC2)
* Determines whether the data can be used to support the claim (8.1.3, LS4.B.2, and CCC2)
* Describes the impact on society of the genetic manipulation (8.1.3, LS4.B.2, and CCC2)

Task provides data from multiple sources on genetic manipulation in a single species:

* Combines and synthesizes the data (8.1.3, LS4.B.2, and CCC2)
* Describes the process of genetic manipulation used (8.1.3, LS4.B.2, and CCC2)
* Assesses the impact of the genetic manipulation (8.1.3, LS4.B.2, and CCC2)

Task provides a scenario in which a genetic manipulation can solve a particular agricultural problem (e.g., crops, livestock, etc.):

* Describes one or more processes that could provide a solution (8.1.3, LS4.B.2, and CCC2)
* Identifies potential negative or positive effects of the genetic manipulation needed to solve the problem (8.1.3, LS4.B.2, and CCC2)
* Uses the information presented to identify the most reasonable solution (8.1.3, LS4.B.2, and CCC2)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Genetic modification in food crops
* Gene therapy to treat or prevent diseases
* Domestication of animals
* Selective breeding in animal husbandry
* Development of polyploid plants

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Artificial selection is bad for organisms.
* Natural selection is a directed process with a specific goal.
* Selection against a species means the species will become extinct.
* Humans domesticated animals through natural selection.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-LS4-5 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-LS4-5 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-LS4-5%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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