

3-LS3-2 Heredity: Inheritance and Variation of Traits

California Science Test—Item Content Specifications

# 3-LS3-2 Heredity: Inheritance and Variation of Traits

Students who demonstrate understanding can:

Use evidence to support the explanation that traits can be influenced by the environment.

[Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Constructing Explanations and Designing Solutions  Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.  Use evidence (e.g., observations, patterns) to support an explanation. | LS3.A: Inheritance of Traits  3. Other characteristics result from individuals’ interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment.  LS3.B: Variation of Traits  3. The environment also affects the traits that an organism develops. | Cause and Effect  Cause and effect relationships are routinely identified and used to explain change. |

## 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 explanatory account of a phenomenon

### Disciplinary Core Idea Assessment Targets

#### LS3.A.3

* Describe that traits can be influenced by the environment
* Describe that inherited traits vary between organisms of the same type
* Describe that some traits result from the combination of inherited information and environmental influence
* Describe environmental factors that can influence traits

#### LS3.B.3

* Describe that the environment can affect the traits an organism develops
* Describe that traits can be variable due to environmental conditions
* Use reasoning to connect evidence and support an explanation about environmental influence on inherited traits in organisms

### Crosscutting Concept Assessment Target(s)

CCC2 Identify and test cause and effect relationships to explain change

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides data comparing appearance of a trait under different conditions:

* Makes a quantitative and/or qualitative conclusion regarding the relationships between dependent and independent variables (6.1.1, LS3.A.3, and CCC2)
* Describes how the evidence allows for the distinction between causal and correlational relationships (6.1.1, LS3.A.3, and CCC2)

Task provides data on variations in a trait for a given species with different amounts of a particular variable:

* Student correctly uses scientific concepts, principles, theories, and big ideas to explain how the evidence supports a conclusion about environmental influence on traits (6.1.2, LS3.B.3, and CCC2)

Task provides a model about how the environment can influence a trait:

* Uses scientific models to construct an explanation of a phenomenon (6.1.3, LS3.B.3, and CCC2)
* Uses models to represent their explanation (6.1.3, LS3.B.3, and CCC2)

Task provides data to describe the impact of the environment on a particular trait under different conditions:

* Uses data to support or refute an explanatory account of a phenomenon (6.2.2, LS3.A.3, LS3.B.3, 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.

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Effects of diet or nutrient availability on traits such as animal weight, flower color, or seed production
* Exposure to abiotic factors (water, sunlight, chemicals, etc.)
* Effect of physical activity level on animal weight
* Learned responses (e.g., songs learned by birds, tool use by birds)
* Comparison of two ecotypes of the same species

## Common Misconceptions

Note that the list in this section is not exhaustive.

* The environment cannot impact genetically determined traits.
* Organisms can consciously change their phenotypes to better survive in a given environment.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

[3-LS3-2 Evidence Statement](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/3-LS3-2%20Evidence%20Statements%20June%202015%20asterisks.pdf) <https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/3-LS3-2%20Evidence%20Statements%20June%202015%20asterisks.pdf>

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

[California Education and the Environment Initiative](http://californiaeei.org/) <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 Environmental Principles and Concepts <https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix2.pdf>

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