

4-LS1-2 From Molecules to Organisms: Structures and Processes

California Science Test—Item Content Specifications

# 4-LS1-2 From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

[Clarification Statement: Emphasis is on systems of information transfer.] [*Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.*]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Developing and Using Models  Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.  Use a model to test interactions concerning the functioning of a natural system. | LS1.D: Information Processing   1. Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal’s brain. Animals are able to use their perceptions and memories to guide their actions. | Systems and System Models  A system can be described in terms of its components and their interactions. |

## 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

2.2 Ability to use 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

2.2.1 Ability to use a model to collect evidence to reason qualitatively or quantitatively about concepts and relationships represented in the model

2.2.2 Ability to use a model to generate explanations and predictions about the behavior of a scientific phenomenon

### Disciplinary Core Idea Assessment Targets

#### LS1.D.2

* Explain that different types of sensory receptors detect specific types of information in an animal’s environment
* Describe that sensory receptors send information about the surroundings to the brain
* Describe that information that is transmitted to the brain by sensory receptors can be processed immediately as perception of the environment and/or stored as memories
* Describe that immediate perceptions processed by the brain or stored memories of perceptions influence an animal’s actions or responses to factors in the environment
* Describe that different types of sensory information lead to different types of responses

### Crosscutting Concept Assessment Target(s)

CCC4 Describe a system in terms of its components and their interactions

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides a model of an animal receiving information through one or more types of sensory receptors, processing the information in the brain, and responding to the information:

* Labels the components of the model (2.1.1, LS1.D.2, and CCC4)
* Selects components of the model to illustrate and explain the process (2.1.1, LS1.D.2, and CCC4)
* Describes the relationships between components in the model to explain the processes (2.1.1, LS1.D.2, and CCC4)
* Analyzes the provided model and correctly identifies relationships (e.g., different sensory inputs cause different responses) among the different components of the sensory system (2.2.1, LS1.D.2, and CCC4)
* Provides a reasoned explanation about how the components illustrated by the model transfer information to produce a response (2.2.1, LS1.D.2, and CCC4)
* Explains the reception-and-response process that the provided model is trying to convey (2.2.2, LS1.D.2, and CCC4)
* Makes a reasonable prediction of an animal’s response that is aligned with the provided model (2.2.2, LS1.D.2, and CCC4)

Task provides an incomplete model of information transfer showing one or more animals receiving, processing, and responding to information:

* Completes the model (2.1.1, LS1.D.2, and CCC4)
* Explains the process of information transfer (2.1.1, LS1.D.2, and CCC4)

Task provides a context of an animal receiving information through one or more types of sensory receptors, processing the information in the brain, and responding to the information:

* Generates a model that represents information transfer in the animal example provided (2.1.1, LS1.D.2, and CCC4)
* Uses labels and/or representations to explain the mechanisms/predict the processes involved in the reception and response process (2.1.3, LS1.D.2, and CCC4)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Temperature
* Sound
* Smell
* Sweating or panting
* Shivering
* Blinking

## Common Misconceptions

Note that the list in this section is not exhaustive.

* The brain is not involved in reflexive reactions to stimuli.
* Animals respond to all stimuli in the same way.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

[4-LS1-2 Evidence Statement](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-LS1-2%20Evidence%20Statements%20June%202015%20asterisks.pdf) [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/4-LS1-2 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-LS1-2%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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