

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

California Science Test—Item Content Specifications

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

Students who demonstrate understanding can:

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

[Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.] [*Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level.*]

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 Models Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.  Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. | LS1.A: Structure and Function  1. Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. | Systems and System Models Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. |

## 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 models to identify concepts and relationships represented in the models

2.2.2 Ability to use models to generate explanations and predictions about a scientific phenomenon

### Disciplinary Core Idea Assessment Targets

#### LS1.A.8

* Describe the major roles of the component parts of organ systems
* Describe a likely effect on an organism if one of the component parts of an organ system does not function normally
* Describe the contributions of particular tissues that make up organs in an organ system
* Describe likely effects on an organism if a particular tissue found in the body does not function normally
* Describe how organ systems interact to maintain homeostasis

### Crosscutting Concept Assessment Target(s)

CCC4 Use models to represent systems and their interactions—such as inputs, processes, and outputs—and energy and matter flows within systems

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides component organs of an organ system:

* Describes relationships between organs (e.g., how the function of one organ is dependent on the normal functioning of another organ in the organ system) (2.1.1, LS1.A.8, and CCC4)
* Describes relationships between tissues and organs (e.g., how an organ system is dependent on the normal functioning of a particular tissue in a component organ) (2.1.1, LS1.A.8, and CCC4)
* Describes how the interacting systems of an organism are dependent on the correct functioning of the components of different organ systems (2.1.1, LS1.A.8, and CCC4)
* Predicts the likely effect on the interactions of an organ system or organism in the absence or malfunctioning of the organ or tissue. (2.1.1, LS1.A.8, and CCC4)

Task provides an incomplete model of an organ system:

* Completes the model (2.1.1, LS1.A.8, and CCC4)
* Describes the relationships among the components of the model (2.1.1, LS1.A.8, and CCC4)

Task provides a representation of a mechanism important to the correct functioning of an organ or organ system:

* Interprets how a change to one part of the organ system will most likely affect another part of the organ system (2.1.3, LS1.A.8, and CCC4)

Task provides a simulation of an organ system in which one factor can be manipulated:

* Analyzes the relationship between the factor and another factor of the organ system or organism as a whole after manipulating the model (2.2.1, LS1.A.8, and CCC4)
* Predicts how a change to one factor in an organ system will impact the function of the organ system (2.2.1, LS1.A.8, and CCC4)

Task provides a model of two or more organ systems of an organism:

* Interprets the interactions between organ systems (2.2.2, LS1.A.8, and CCC4)
* Predicts outcomes to the organ systems if one component fails (2.2.2, LS1.A.8, and CCC4)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Interaction of tissues during an involuntary reaction such as a “knee-jerk” reflex, hiccup, or sneeze
* Impairment of organ systems (e.g., effects of celiac disease)
* Different cell and tissue types specialized to absorb nutrients in the gastrointestinal tract

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Systems in the human body work in isolation.
* A change in function to an organ system leads to the death of an organism.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

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