

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

California Science Test—Item Content Specifications

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

Students who demonstrate understanding can:

Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

[Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.] [*Assessment Boundary: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.*]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Developing and Using Models  Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.  Develop and use a model to describe phenomena. | LS1.A: Structure and Function  4. Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. | Structure and Function  Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. |

## 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

2.1.3 Ability to determine scope, scale, and grain-size of models, as appropriate for their intended use

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.4

* Develop a model to identify the components (e.g., nucleus, chloroplasts, cell wall, mitochondria, cell membrane) of cells
* Describe the relationships among cellular components, including the particular functions of parts of cells in terms of their contributions to overall cellular functions
* Describe the structure of the cell membrane or cell wall and its relationship to the function of the organelles and the whole cell
* Use a model to describe how different components of a cell contribute to the function of the cell as a whole
* Use a model to describe the effect on the function of the cell as a whole if a particular component (e.g., nucleus, chloroplasts, cell wall, mitochondria, cell membrane) of the cell does not function normally
* Use a model to identify key differences between plant and animal cells based on structure and function

### Crosscutting Concept Assessment Target(s)

CCC6 Analyze complex natural structures and systems by using visualizations and models to describe how their function depends on relationships among their components

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides a model of a cell:

* Identifies components of the cell (2.1.1, LS1.A.4, and CCC6)
* Describes behaviors and relationships between the components to illustrate or explain the ways the parts of the cell contribute to overall function (2.1.1, LS1.A.4, and CCC6)
* Selects the relative scale and size of the components appropriate for the intended use of the model (2.1.2, LS1.A.4, and CCC6)
* Completes the model to represent or explain particular mechanisms or behaviors of the cell or its component parts (2.1.3, LS1.A.4, and CCC6)

Task provides an incomplete model of a cell or a cell function:

* Identifies and labels missing components (2.1.1, LS1.A.4, and CCC6)

Task provides models of different cells that include representations of parts of the cell:

* Identifies evidence for functional relationships represented among different components of the models (2.2.1, LS1.A.4, and CCC6)
* Uses the models to collect evidence of the differences between plant and animal cells (2.2.1, LS1.A.4, and CCC6)

Task provides models of different types of cells that differ with respect to the presence or quantity of certain structures:

* Identifies the types of cells (2.2.2, LS1.A.4, and CCC6)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Visualizations of different types of cells to identify their components
* Models of cells that illustrate the scope and scale of various components
* Structures and functions of plant and animal cells
* The contributions of cell components to a particular function of the cell (e.g., cellular respiration, photosynthesis, endocytosis)
* Visualizations of specialized cells used to identify their function based on their internal structure and components

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Each component of a cell functions independently.
* All components of the cell are the same size.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

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