

MS-LS1-1 From Molecules to Organisms: Structures and Processes

California Science Test—Item Content Specifications

# MS-LS1-1 From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

[Clarification Statement: Emphasis is on developing evidence that living things (including Bacteria, Archaea, and Eukarya) are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells. Viruses, while not cells, have features that are both common with, and distinct from, cellular life.]

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 |
| --- | --- | --- |
| Planning and Carrying Out Investigations  Planning and carrying out investigations in 6–8 builds on K–5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.  Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. | LS1.A: Structure and Function   1. All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). | Scale, Proportion, and Quantity  Phenomena that can be observed at one scale may not be observable at another scale.  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. |

## Assessment Targets

Assessment targets describe the focal knowledge, skills, and abilities for a given three-dimensional Performance Expectation. Please refer to the Introduction (hyperlink to section on explanation of assessment targets) 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.

3.2 Ability to develop, evaluate, and refine a plan for the investigation

3.3 Ability to collect the data for the investigation

### 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.

3.2.1 Ability to decide how to observe and/or measure relevant variables, considering the level of accuracy and precision required and the kinds of instrumentation and techniques best suited to making such measurements

3.2.2 Ability to describe a detailed experimental procedure (e.g., number of trials, identify the control) and experimental setup

3.3.1 Ability to use appropriate tools for accurate and precise measurements

3.3.2 Ability to make observations according to the investigation plan

3.3.3 Ability to evaluate the quality of data to determine if the evidence meets the goals of the investigation

### Disciplinary Core Idea Assessment Targets

#### LS1.A.3

* Identify and describe that all living things are made up of cells
* Develop an investigation to provide evidence for the claim that all living things are made of cells
* Develop an investigation to provide evidence for the claim that the cell is the smallest unit that can be said to be alive
* Collect data to distinguish between living and nonliving things
* Collect data to distinguish between unicellular and multicellular organisms
* Collect data to distinguish between a multicellular organism composed of a single cell type and a multicellular organism composed of varied cell types
* Describe different types of cells within a multicellular organism

### Crosscutting Concept Assessment Target(s)

CCC3 Identify that phenomena observed at one scale may not be observable at another scale

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides a list of materials or tools for an investigation to supply evidence that living things are made of cells:

* Identifies materials/tools best suited to make measurements for the investigation (3.2.1, LS1.A.3, and CCC3)
* Measures and observes characteristics to supply the appropriate evidence (3.2.1, LS1.A.3, and CCC3)

Task provides a list of materials or tools for an investigation to supply evidence that living things can be unicellular or multicellular:

* Measures and observes characteristics to supply the appropriate evidence (3.2.1, LS1.A.3, and CCC3)

Task provides multiple experimental procedures or designs to compare living and nonliving things:

* Selects the appropriate procedure(s) or design(s) to be able to compare living and nonliving things (3.2.2, LS1.A.3, and CCC3)

Task provides a simulation of an experiment to determine whether a material is a living thing that is composed of at least one cell:

* Identifies pros and cons of the demonstrated data collection process (3.3.1, LS1.A.3, and CCC3)

Task provides a simulation of an experiment to determine whether an organism is unicellular or multicellular:

* Uses tools and techniques to collect data useful for investigating the scientific problem under investigation (3.3.1, LS1.A.3, and CCC3)

Task provides an animation of an investigation to determine whether all living things are made of cells:

* Describes and identifies observations relevant to the scientific problem under investigation (3.3.2, LS1.A.3, and CCC3)

Task provides a simulated model of cells showing some characteristic of being alive, such as performing cellular respiration:

* Records observations from the model to support the claim that the cells are alive (3.3.2, LS1.A.3, and CCC3)

Task describes an investigation to determine if a material is made of cells and therefore is a living thing:

* Identifies whether the data collected can be used to determine if the material is living or nonliving (3.3.3, LS1.A.3, and CCC3)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Materials that may contain varying characteristics related to life
* A simulation that provides an opportunity for students to expose cells to a variety of environmental stimuli and observe the response of the cells
* A simulation that allows students to manipulate the input of materials to a cell and observe the subsequent outputs and cell activity
* Cell representations that can be sorted into individual unicellular organisms and specialized members of a multicellular organism
* Identification of characteristics indicative of life (e.g., presence of cells) to investigate whether a sample consists of living things

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Cells are too small to be alive.
* Only animals are made of cells.
* All living things are made of many cells.
* Only cells from multicellular organisms have organelles that perform specific functions.
* Organisms that are large and/or multicellular have larger cells.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-LS1-1 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-LS1-1 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-LS1-1%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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