

MS-ESS3-5 Earth and Human Activity

California Science Test—Item Content Specifications

# MS-ESS3-5 Earth and Human Activity

Students who demonstrate understanding can:

Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

[Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]

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 |
| --- | --- | --- |
| Asking Questions and Defining Problems  Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.  Ask questions to identify and clarify evidence of an argument. | ESS3.D: Global Climate Change   1. Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth’s mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. | Stability and Change  Stability might be disturbed either by sudden events or gradual changes that accumulate over time. |

## 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.

1.2 Ability to ask and evaluate scientific questions arising from examining models, explanations, and arguments to specify relationships between variables

### 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.

1.2.1 Ability to ask questions that clarify and refine a model or an explanation

1.2.3 Ability to ask and/or evaluate questions that challenge the premise(s) of an argument, or provide interpretation of a data set

### Disciplinary Core Idea Assessment Targets

#### ESS3.D.1

* Identify patterns in data about carbon dioxide emissions (and other greenhouse gases) from human activities and global temperature and describe the relationship between them over the past century
* Describe the effectiveness of possible climate change mitigation strategies (e.g., reductions in emissions or making changes in fuel usage) based on knowledge about past human behaviors and considerations of resource costs (including time, human capital, and material cost)
* Identify the effect of natural processes (e.g., volcanism, natural carbon dioxide cycling in plant life, and variations in solar radiation) on global temperature and distinguish it from the effect of human activities
* Identify potential outcomes of climate change (including changes to weather patterns and changes to ecosystems) and classify them in terms of their effects
* Identify patterns in data regarding carbon dioxide released from human activities and global temperatures and describe the relationship between them over the past century
* Identify patterns in data that connect natural processes and human activities to changes in global temperatures and carbon dioxide and other greenhouse gases over the past century

### Crosscutting Concept Assessment Target(s)

CCC7 Identify sources of change as being either sudden events or gradual changes that accumulate over time

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides a graph predicting both future emission rates and future surface temperatures:

* Asks questions to correctly clarify why surface temperatures continue to rise even if emissions have decreased (1.2.1, ESS3.D.1, and CCC7)
* Predicts changes due to varying emission rates (1.2.1, ESS3.D.1, and CCC7)

Task provides a series of graphs, tables, and/or maps displaying different climate predictions for the next several decades:

* Asks questions about improvements in methodology, decreases in uncertainty or error, and the difference between refinements in models to understand the ongoing debate regarding the role of human activities in climate change (1.2.1, ESS3.D.1, and CCC7)

Task provides an explanation for the differential role of short-term and long-term climate impacts due to various factors:

* Asks a testable question that could be used to evaluate differential impacts (1.2.1, ESS3.D.1, and CCC7)

Task provides an argument regarding evidence for human-driven climate change:

* Identifies questions which best challenge the scientific reasoning of the argument (1.2.3, ESS3.D.1, and CCC7)

Task provides an argument in favor of a policy position regarding potential steps a local/national/or global initiative could implement to mitigate climate change:

* Identifies questions which best evaluate the resource cost of the initiative (including human capital, material cost, and time) and best challenge the viability of the proposed initiative (1.2.3, ESS3.D.1, and CCC7)

Task provides a series of photos, graphs, and/or maps showing the melting of glacial ice:

* Identifies questions about the rates of change in ice caps which are empirically testable (1.2.3, ESS3.D.1, and CCC7)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* A comparison of the short-term impacts of volcanic eruptions to carbon dioxide emissions released from human activities
* Claims made at the local, national, or global level about the impacts of increases in mean surface temperature
* A comparison of the climate of the past ice age to today
* Data predicting the effects of climate change (e.g., rate of sea surface water temperature change)
* Patterns and relationships in climate change data (e.g., the relationship between released carbon dioxide and global temperatures)

## Common Misconceptions

Note that the list in this section is not exhaustive.

* The terms climate and weather are interchangeable.
* Humans are the only driver of climate change.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-ESS3-5 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-ESS3-5 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-ESS3-5%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>

Posted by the California Department of Education, March 2021 (updated February 2024)