

5-PS2-1 Motion and Stability: Forces and Interaction

California Science Test—Item Content Specifications

# 5-PS2-1 Motion and Stability: Forces and Interaction

Students who demonstrate understanding can:

Support an argument that the gravitational force exerted by Earth on objects is directed down.

[Clarification Statement: “Down” is a local description of the direction that points toward the center of the spherical Earth.] [*Assessment Boundary: Assessment does not include mathematical representation of gravitational force*.]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Engaging in Argument from EvidenceEngaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).Support an argument with evidence, data, or a model. | PS2.B: Types of Interactions1. The gravitational force of Earth acting on an object near Earth’s surface pulls that object toward the planet’s center.
 | Cause and EffectCause and effect relationships are routinely identified and used to explain change. |

## 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.

7.1 Ability to construct scientific arguments

### 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.

7.1.1 Ability to identify evidence/data that supports a claim

7.1.3 Ability to use reasoning to explain how relevant evidence/data supports or refutes the claim; the reasoning should reflect application of scientific concepts, principles, ideas, and models

### Disciplinary Core Idea Assessment Targets

#### PS2.B.4

* Describe that when released, objects fall straight down
* Explain that down is a relative term and applies to an observer’s frame of reference
* Define down as referring to a direction pointing toward the center of Earth
* Describe that the gravitational force exerted by Earth pulls objects toward its center
* Describe the evidence that Earth is spherical

### Crosscutting Concept Assessment Target(s)

CCC2 Identify cause and effect relationships, using them to explain changes

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides an argument with a claim and evidence/data about a phenomenon illustrating the downward gravitational force of Earth acting on an object or objects:

* Explains whether the evidence is sufficient to support the claim or additional evidence is needed (7.1.2, PS2.B.4, and CCC2)

Task provides a claim and multiple pieces of relevant and irrelevant evidence/data about a phenomenon illustrating the downward gravitational force of Earth acting on an object or objects:

* Selects the evidence that best supports the claim (7.1.2, PS2.B.4, and CCC2)

Task provides multiple arguments with a claim and strong or weak evidence/data about a phenomenon illustrating the downward gravitational force of Earth acting on an object or objects:

* Selects the argument with the claim supported by the strongest evidence (7.1.2, PS2.B.4, and CCC2)

Task provides a claim and evidence, data, or a model about a phenomenon illustrating the downward gravitational force of Earth acting on an object or objects:

* Constructs an argument using the provided evidence, data, or model and scientific concepts (e.g., the gravitational force) to support the claim (7.1.3, PS2.B.4, and CCC2)
* Selects the argument that best uses the evidence, data, or model and scientific concepts (e.g., the gravitational force) to support the claim (7.1.3, PS2.B.4, and CCC2)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Different objects falling downward at the same location
* An object falling downward at widely separated locations on Earth
* Objects of varying mass (with similar shape and volume) falling at the same rate

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Because Earth looks flat, it is flat.
* Objects on the other side of Earth fall up.
* Gravity is its own force, not one caused by Earth itself.
* Gravity only affects objects on or above the surface of Earth.
* Gravity pulls an object in the direction of the object’s motion.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

5-PS2-1 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/5-PS2-1 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/5-PS2-1%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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