

3-PS2-2 Motion and Stability: Forces and Interactions

California Science Test—Item Content Specifications

# 3-PS2-2 Motion and Stability: Forces and Interactions

Students who demonstrate understanding can:

Make observations and/or measurements of an object’s motion to provide evidence that a pattern can be used to predict future motion.

[Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.] [*Assessment Boundary: Assessment does not include technical terms such as period and frequency.*]

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 InvestigationsPlanning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.Connections to Nature of ScienceScience Knowledge is Based on Empirical EvidenceScience findings are based on recognizing patterns. | PS2.A: Forces and Motion1. The patterns of an object’s motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.)
 | PatternsPatterns of change can be used to make predictions. |

## 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.

3.1 Ability to clarify the goal of the investigation and identify the evidence needed to address the purpose of 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.

3.1.1 Ability to describe the purpose of the investigation

3.1.2 Ability to identify relevant independent and dependent variables and to consider possible confounding variables or effects

3.1.3 Ability to describe what and how much data need to be collected to provide sufficient evidence for the purpose of the investigation

3.1.4 Ability to describe how the observations and/or collected data can be used as evidence for the phenomenon under investigation

3.3.1 Ability to use appropriate tools for accurate and precise measurements

### Disciplinary Core Idea Assessment Targets

#### PS2.A.4

* Recognize patterns in the motion of an object
* Explain that patterns in the motion of an object can be used to predict the future motion of the object
* Identify the observations and measurements to collect as data to provide evidence of patterns in the motion of an object
* Use the appropriate tools and techniques to collect data to provide evidence of patterns in the motion of an object

### Crosscutting Concept Assessment Target(s)

CCC1 Use patterns of change to make predictions

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides phenomenon that involves motion with a predictable pattern and an investigation plan:

* Identifies the purpose of the investigation (3.1.1, PS2.A.4, and CCC1)

Task provides phenomenon that involves motion with a predictable pattern and an investigation plan that includes a list of variables:

* Identifies the dependent and independent variables (3.1.2, PS2.A.4, and CCC1)

Task provides phenomenon that involves motion with a predictable pattern, a question about future motion, and a list of investigation plans:

* Identifies the plan that will provide the best evidence of a pattern that can be used to make a prediction about future motion (3.1.3, PS2.A.4, and CCC1)

Task provides phenomenon that involves motion with a predictable pattern and a question about future motion:

* Identifies the data that are useful to record to determine a pattern that can be used to make a prediction about future motion (3.1.3, PS2.A.4, and CCC1)

Task provides phenomenon that involves motion with a predictable pattern and data or observations from an investigation:

* Identifies the data or observations that can be used to make a prediction about future motion (3.1.4, PS2.A.4, and CCC1)

Task provides phenomenon that involves motion with a predictable pattern and an investigation plan that includes a list of measuring tools/techniques:

* Identifies the appropriate measuring tools/techniques to collect data (3.3.1, PS2.A.4, and CCC1)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* A pendulum or a child on swing
* A ball rolling back and forth on a ramp or in a bowl
* Children on a seesaw
* A block hanging from a spring

## Common Misconceptions

Note that the list in this section is not exhaustive.

* There is a natural tendency for an object to be at rest.
* There are no forces acting on an object at rest.
* A force is needed to keep an object moving with a constant speed.
* Force is an internal property of objects that may be used up over time.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

[3-PS2-2 Evidence Statement](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/3-PS2-2%20Evidence%20Statements%20June%202015%20asterisks.pdf) <https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/3-PS2-2%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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