

3-PS2-4 Motion and Stability: Forces and Interactions

California Science Test—Item Content Specifications

# 3-PS2-4 Motion and Stability: Forces and Interactions

Students who demonstrate understanding can:

Define a simple design problem that can be solved by applying scientific ideas about magnets.

[Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Asking Questions and Defining Problems  Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.  Define a simple problem that can be solved through the development of a new or improved object or tool. | **PS2.B: Types of Interactions**  3. Electric, and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. | Connections to Engineering, Technology, and Applications of Science  Interdependence of Science, Engineering, and Technology  Scientific discoveries about the natural world can often lead to new and improved technologies, which are developed through the engineering design process. |

## 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.

1E.2 Ability to define a design problem

### 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.

1E.2.1 Ability to define a design problem that would lead to the development or improvement of an object or tool based on an understanding of science concepts and usability considerations

1E.2.2 Ability to define a design problem to develop an object, process, or system that takes into consideration criteria and constraints based on scientific concepts

### Disciplinary Core Idea Assessment Targets

#### PS2.B.3

* Describe how the force between magnetic objects do not require that those objects be in contact with each other
* Describe how the size of a magnetic force depends on the properties of objects
* Describe how the size of a magnetic force depends on the distance between objects
* Describe how a magnetic force depends on the orientation of magnetic objects relative to one another

### Crosscutting Concept Assessment Target(s)

Not applicable

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task describes a scenario of a problem that could be addressed by using magnets:

* Creates a problem definition statement for the scenario (1E.2.1 and PS2.B.3)
* Selects the best problem definition from among a list of alternatives (1E.2.1 and PS2.B.3)

Task describes a scenario of a problem that could be addressed by using magnets along with stating a design problem:

* Suggests/indicates improvements to the design problem by including relevant criteria, constraints, and consideration for testing the solution (1E.2.2 and PS2.B.3)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Constructing a latch to keep a door or container shut
* Designing a way to sort through a pile of materials to remove only the iron (or other ferromagnetic) objects
* Developing a way to hold objects in place
* Designing a setup using magnets to move an object

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Magnetism requires objects to be in contact with each other.
* All metals are attracted to magnets.
* The distance separating magnetic objects does not influence the magnitude of magnetic forces.
* Magnets always repel each other.
* Magnets always attract each other.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

[3-PS2-4 Evidence Statement](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/3-PS2-4%20Evidence%20Statements%20June%202015%20asterisks.pdf) <https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/3-PS2-4%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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