

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

California Alternate Assessment for Science—Item Content Specifications

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

| California Science Connector | Focal Knowledge, Skills, and Abilities | Essential Understanding |
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| Recognize that a change in an object’s motion can be due to the mass of the object or the forces acting on the object by using data on the motion of the object. | 1. Ability to recognize that a change in an object’s motion can be due to the mass of the object by using data on the motion of the object. 2. Ability to recognize that a change in an object’s motion can be due to the forces acting on the object by using data on the motion of the object. | Recognize that a larger force causes a larger change in the motion of an object. |

## **CA NGSS Performance Expectation**

Students who demonstrate understanding can:

**Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.** [Clarification Statement: Emphasis is on balanced (Newton’s First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton’s Second Law), frame of reference, and specification of units.] *[Assessment Boundary*: *Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.]*

## Mastery Statements

Students will be able to:

* Identify that a stronger push or pull results in a greater change in motion of an object
* Recognize that an object’s mass will affect the result of the force acting on the object
* Recognize the effect of a force on how the motion of an object changes (speed or direction)
* Use a data table to analyze which object’s motion will be most affected by the same amount of applied force
* Use a data table to analyze which force will most affect the motion of objects of equal masses

## Possible Phenomena or Contexts

*Note that the list in this section is not exhaustive or prescriptive.*

**Possible contexts include the following:**

* Cart launched into motion by a force (e.g., spring-loaded plunger)
* Cart-pulley-mass system on a ramp
* Balls or other toys that roll
* Wagons, trailers and other objects that can be pulled

## Additional Assessment Boundaries

* None listed at this time

## Additional References

California Science Test Item Specification for MS-PS2-2

<https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-ms-ps2-2.docx>

The *2016 Science Framework for California Public Schools Kindergarten through Grade Twelve* <https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp>

Appendix 1: Progression of the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in Kindergarten through Grade Twelve

<https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix1.pdf>

Posted by the California Department of Education, July 2025