K-PS2 Motion and Stability: Forces and Interactions

Students who demonstrate understanding can:

**K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.** [Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.] [Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.]

**K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.* [Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a certain path, or knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.] [Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.]

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**Science and Engineering Practices**

- Planning and Carrying Out Investigations
  - Planning and carrying out investigations to answer questions or test solutions to problems in K-2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.
  - With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1)
- Analyzing and Interpreting Data
  - Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
  - Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2)

**Disciplinary Core Ideas**

**PS2.A: Forces and Motion**
- Pushes and pulls can have different strengths and directions. (K-PS2-1),(K-PS2-2)
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1),(K-PS2-2)

**PS2.B: Types of Interactions**
- When objects touch or collide, they push on one another and can change motion. (K-PS2-1)

**PS3.C: Relationship Between Energy and Forces**
- A bigger push or pull makes things speed up or slow down more quickly. (secondary to K-PS2-1)

**ETS1.A: Defining Engineering Problems**
- A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (secondary to K-PS2-2)

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**Crosscutting Concepts**

- Cause and Effect
  - Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2-1),(K-PS2-2)

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Connections to Nature of Science

- Scientists use different ways to study the world. (K-PS2-1)

**Common Core State Standards Connections:**

- **RI.K.1** With prompting and support, ask and answer questions about key details in a text. (K-PS2-2)
- **W.K.7** Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS2-1)
- **SL.K.3** Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-PS2-2)
- **MP.2** Reason abstractly and quantitatively. (K-PS2-1)
- **K.MD.A.1** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-PS2-1)
- **K.MD.A.2** Directly compare two objects with a measurable attribute in common, to see which object has “more of” or “less of” the attribute, and describe the difference. (K-PS2-1)

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*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

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