



Inquiry Starters: Force and Motion

This handout provides examples of ways children of different ages can investigate force and motion concepts and phenomena through inquiry experiences.

Interact with this handout:

- Make note of the experiences you might try.
- Plan for ways you might adapt the experiences to meet the abilities and interests of children in your setting.

Inquiry

Encourage children to use different inquiry skills in their investigations. Consider ways children might:

- Ask questions
- Make predictions
- Observe
- Investigate
- Document
- Communicate

Force and Motion Concepts to Explore Through Inquiry

Slope: Support children in noticing the way changing the slope (steepness) of a ramp affects the way objects move down the ramp.

- **Infant/Toddler:** Play with ramps alongside children. Notice the ways children engage with the ramps. You might model for children how increasing the slope of a ramp makes a ball roll faster. Use a very steep ramp and a nearly flat ramp to make the differences in speed noticeable. Encourage children to explore these ideas.
- **Preschool/TK:** Observe authentic opportunities where children might explore slopes in their everyday lives. Encourage children to find ways to make a ball or car roll faster down a slope (ramp). Provide blocks for children to stack beneath one end of the ramp. Children can count the blocks as a way to measure and compare differences in slope.
- **Elementary:** Invite children to notice different slopes in the learning setting and community (for example, the slide, a hill, or accessibility ramps). Children might release objects down the slopes to notice how they move in different ways. Challenge children to design and build model ramps for different purposes (for example, a ramp used for a wheelchair or a ramp used as a slide on a playground). Encourage children to explain their designs and demonstrate how their models work.





What are some ways children in your setting can investigate slope?

Leveraging Lived Experiences

Provide opportunities for children to think about force and motion in their lives using some of the following common items or experiences:

- Bikes, carts, or wagons
- Playground equipment
- Sports

Friction: Support children in noticing the way different surfaces affect the way objects move.

- **Infant/Toddler:** Provide children with access to different materials (for example, a fluffy rug, a smooth sheet of cardstock, or corrugated or bumpy cardboard). Encourage children to feel the different textures and then describe the textures for children. Invite children to explore the materials in different ways. You might model for children the way a ball rolls on the surfaces in different ways. Use language to narrate what children might be noticing.
- **Preschool/TK:** Invite children to explore the different materials on the bottom of shoes. Children might try dragging their feet with different shoes (for example, sandals, sneakers, socks, ballet/dance shoes) and noticing how the different shoe bottoms create different amounts of friction. Encourage children to think about why certain shoes are designed in special ways.
- **Elementary:** Support children in measuring the effects of different surfaces. Invite children to create a ramp structure and experiment with friction by placing different materials at the end of each ramp for the roller to roll across (for example, sand, a rug, corrugated cardboard). Support children in measuring the distance the roller travels for each of the different surface types. Children can create a bar graph to compare the different distances the rollers travel on the various surface types.



What are some ways children in your setting can investigate friction?

Weight: Encourage children to notice the way weight can affect how objects move.

- **Infant/Toddler:** Encourage children to push an empty box across the floor. Add items to the box to make it heavier. Discuss the different amounts of force children used to push the box (for example, “The box is heavy! We have to push it really hard to make it move!” or “The box is empty. It is not heavy at all. It is very easy to push it.”).
- **Preschool/TK:** Explore ramps using rollers with different weights (for example, a marble versus a Ping-Pong ball). Children might notice the effects of weight by trying to knock down objects at the end of a ramp using the different types of rollers. You might encourage children to compare the weights of the rollers using a balance scale.
- **Elementary:** Invite children to design and build a model car (for example, with recycled materials) to race down ramps. Encourage children to experiment with the design of their cars by adding or removing weight. Provide washers or other weighted objects for children to experiment with.

What are some ways children in your setting can experiment with the effects of weight?





Types of movement: Encourage children to investigate the different ways objects move.

- **Infant/Toddler:** Explore objects that roll and slide. Help children notice how differences in shape (for example, flat or rounded) affect the way the object moves.
- **Preschool/TK:** Experiment with bouncing different balls. Children might notice the way balls with different characteristics bounce differently (for example, a ball that is inflated a little might bounce low, and a ball that is inflated a lot might bounce high; a ball with a different shape, like a football, might bounce sideways; a solid wooden ball might not bounce very much at all).
- **Elementary:** Encourage children to consider different places they might find pendulums (for example, the swings at a park or the playground). Then, support children in investigating pendulums and notice the way objects swing back and forth. Children might start to notice patterns in how things move and use those patterns to predict the movement of objects in the future. For example, children might notice that a shorter string causes the object to swing faster than a longer string.

What are some ways children in your setting can investigate different types of movements?

