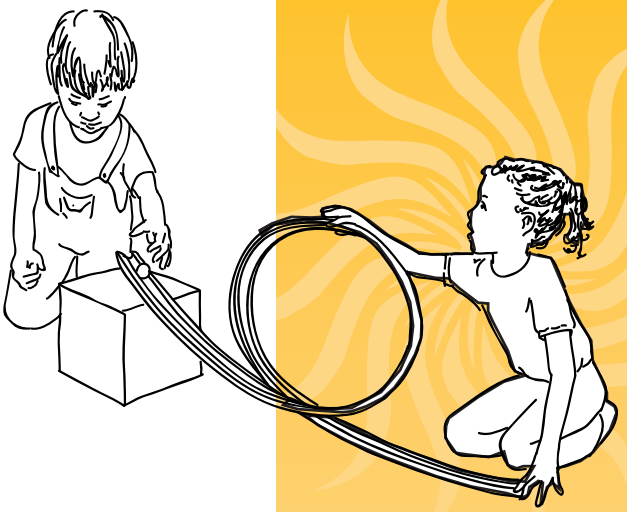
# OVERVIEW
## BALANCE AND MOTION



### GOALS

We live in a dynamic world where everything is in motion, or so it seems. But not everything is moving the same way. Some things move from one place to another. Other things go around and around in a rotational motion. Still other things are stationary, stable for a time, balanced on a thin line between stop and go. These are the global phenomena that students experience in this module, **Balance and Motion.**

#### FOSS EXPECTS STUDENTS TO

- Develop a growing curiosity and interest in the motion of objects.
- Investigate materials constructively during free exploration and in a guided discovery mode.
- Solve problems through trial and error.
- Develop persistence in tackling a problem.
- Explore concepts of balance, counterweight, and stability.
- Observe systems that are unstable and modify them to reach equilibrium.
- Discover different ways to produce rotational motion.
- Construct and observe toys that spin.
- Explore and describe some of the variables that influence the spinning of objects.
- Observe and compare rolling systems with different-sized wheels.
- Explore and describe the motion of rolling spheres.
- Acquire the vocabulary associated with balance and motion.

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# BALANCE AND MOTION MODULE MATRIX

| SYNOPSIS | SCIENCE CONTENT | THINKING PROCESSES |
|---|---|---|
| **1. BALANCE** | | |
| Students discover numerous ways to balance two-dimensional shapes made out of tagboard. They use a piece of pliable wire and counterweights (clothespins) to make a pencil balance on its point. They make mobiles from paper clips, rubber bands, straws, and index cards to apply their understanding of balance, stability, and counterweighting. | • Objects can be balanced in many ways.<br>• A stable position is one that is steady; the object is not falling over.<br>• Counterweights can help balance an object.<br>• A mobile is a system of balanced beams and objects. | • Observe balanced objects.<br>• Observe stable balanced systems.<br>• Compare balanced systems and representations of balanced systems.<br>• Organize materials to make various balanced systems.<br>• Communicate observations of balance and stability, using precise vocabulary. |
| **2. SPINNERS** | | |
| Students make tops from plastic disks and straws, and spin them, exploring the variables that influence the spinning of a top. They use these same disks with string to make zoomers to observe a different kind of spinning motion. They make twirlers (flying spinners), first using straws and paper wings, and then using folded paper and paper clips. | • Objects and systems that turn on a central axis exhibit rotational motion.<br>• The amount and position of mass affect how an object rotates.<br>• There are different ways to initiate rotational motion.<br>• The motion of an object can be changed by pushing or pulling. | • Observe several expressions of rotational motion.<br>• Compare the actions of several different top designs.<br>• Observe rotation of a system falling through air.<br>• Organize materials to make systems that exhibit rotational motion.<br>• Communicate observations and comparisons of rotational motion, using precise vocabulary. |
| **3. ROLLERS** | | |
| Students investigate rolling objects—wheels, cups, and spheres. They make cardboard ramps and investigate wheels of different sizes on axles, and they roll paper cups of two sizes. Students use flexible marble runways to make marbles do tricks. The grand finale involves the whole class cooperating to make one large runway through which a marble can roll nonstop. | • Wheels and spheres roll down a slope.<br>• Axles support wheels.<br>• Wheel-and-axle systems with wheels of different sizes roll toward the smaller wheel.<br>• The amount and location of an added weight can change the way a system rolls. | • Observe several expressions of linear motion.<br>• Observe several kinds of objects and systems that roll.<br>• Compare the paths followed by rolling systems with different-sized wheels.<br>• Organize materials to make systems that roll in different ways.<br>• Communicate observations and comparisons of rolling motion, using precise vocabulary. |



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| INTERDISCIPLINARY EXTENSIONS | FOSS SCIENCE STORIES | HOME/SCHOOL CONNECTION |
|---|---|---|
| **Language Extensions**<br>• Read *Mirette on the High Wire.*<br>• Write a how-to guide on balancing.<br>**Math Extensions**<br>• Solve two problems.<br>• Explore a balance used for weighing.<br>**Science Extensions**<br>• Balance new creations.<br>• Balance objects on strings.<br>• Make a double balance.<br>• Set up a mobile center.<br>• Make big mobiles.<br>• Student projects.<br>**Art Extension**<br>• Make a balance collage. | • *Make It Balance!* | Students explore balance and counterbalance with body movements. |
| **Language Extension**<br>• Write poems about spinning.<br>**Math Extensions**<br>• Solve two problems.<br>**Science Extensions**<br>• Explore Tinkertoy™ tops.<br>• Start a top collection.<br>• Make big and little tops.<br>• Make singing zoomers.<br>• Make drawing tops.<br>• Make traditional twirly birds.<br>• Visit a toy store.<br>**Art Extension**<br>• Create spin art. | • *Push or Pull?*<br>• *Tools and Machines*<br>• *Move It, But Don't Touch It*<br>• *Things That Spin* | Students make a top and a zoomer, and report on their explorations. |
| **Language Extensions**<br>• Discuss runway creations.<br>• Write rolling sentences.<br>• Write or illustrate the travels of a sphere.<br>**Math Extensions**<br>• Solve two problems.<br>• Chart rollers and spinners.<br>**Art Extension**<br>• Draw pathways.<br>**Science Extensions**<br>• Make giant wheels.<br>• Look at rolling toys.<br>• Investigate force with rolling magnets. | • *Rolling, Rolling, Rolling!*<br>• *Strings in Motion* | Students search for rollers and spinners in the home and neighborhood. |



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# FOSS AND NATIONAL STANDARDS

The **Balance and Motion Module** emphasizes the development of observation and description skills and building explanations based on experience. This module supports the following National Science Education Standards.

### SCIENCE AS INQUIRY

Develop students' abilities to do and understand scientific inquiry.

- Ask and answer questions.
- Plan and conduct simple investigations.
- Employ tools and techniques to gather data.
- Use data to construct reasonable explanations.
- Communicate investigations and explanations.
- Understand that scientists use different kinds of investigations and tools to develop explanations using evidence and knowledge.

### CONTENT: PHYSICAL SCIENCE

Develop students' understanding of the position and motion of objects.

- Describe the position of an object by relating its location to another object or the background.
- Describe an object's motion by tracing its position over time.
- Change an object's position or motion by pushing or pulling.

### SCIENCE AND TECHNOLOGY

Develop students' abilities in technological design.

- Identify a simple problem and propose a solution.
- Evaluate a product or design.
- Communicate a problem, design, and solution.



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