# Objects in Motion

By Peggy Ashbrook

PHOTOGRAPHS COURTESY OF THE AUTHOR

Objects in motion attract children. Because they remain interesting all year long, small spinning tops are a good choice for long-term residency on the science table, along with magnifiers, tweezers, and pipettes. Rather than tools for manipulating objects, they are tools for exploring laws of motion.

Tops are available in many forms. Even two-year-olds can spin the kind that is a flat disk with a shiny pattern, sometimes called a "lazer" or "mylar" top. Putting different types together on a tray invites comparison—how easy is it to spin the big top compared to the small one (flat/tall, wood/plastic, solid/hollow)? With continued experience using tops of different sizes and shapes, children learn that the top will spin faster and longer if they push faster as they spin it or spin it on a smooth table rather than on a cloth and that the top will remain upright while it spins fastest but begins to tilt as it slows to a stop. Open-ended questions can help a child express what they have learned and to think further: "What do you notice about the top? Tell me what you see. Why did that top keep spinning? How are those tops the same?"

A marble race is another high-interest tool for exploring motion. Students can build "tracks" using cardboard tubes taped at various angles to a vertical surface such as a wall or large box. Young children also delight in making a ramp to roll toy cars. Children understand that the small cars zooming down the ramp are models that represent actual cars.

The following activity helps children explore the motion of bodies riding in a vehicle and safely demonstrates the answer to their question, "Why do I need a seatbelt?" Children will enjoy moving the cup around, even if all they "see" is a cup rather than understanding it represents a car. They will understand that each time they suddenly stop the cup, the marble will roll out unless it is taped in, even if they do not yet understand that the same forces apply to passengers in a car. Exploring motion addresses parts of the National Science Education Content Standards A: Science as Inquiry (Abilities necessary to do scientific inquiry) and B: Physical Science (Position and motion of objects). The importance of using seatbelts also fits in with the Personal Health part of Content Standard F, "individuals have some responsibility for their own health." ■

***Peggy Ashbrook* (scienceissimple@yahoo.com) *is the author of* Science is Simple: Over 250 Activities for Preschoolers *and teaches preschool science in Alexandria, Virginia.***

## Reference

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academy Press.

## Crash Dummy Fun!

### Objective:

To provide experience using models to explore motion and force

### Materials:

- Clear plastic cups
- Marbles
- Tape

### Procedure:

1. Gather the children (entire class or small group) into a circle. Hold up the clear plastic cup and say, "This is my pretend car. I'm going to go for a drive and this marble is me."
2. Holding the cup on its side with the open end forward, place the marble inside the clear plastic cup, and push the car-cup forward slowly across the floor, and then slowly stop it, saying, "Brrrm-mm, brmm, brrrmmmm. Stop sign." The marble should stay in the cup.
3. Then go out for another "drive," this time stopping suddenly to avoid another "car." Say, "Brmmm, brmmm. Uh-oh! That other car moved too close in front of me. I have to stop suddenly so it doesn't bump my car! (tire screech)" Stop quickly enough that the marble rolls out of the cup.
4. Ask the children to tell you what happened and what happened to "you." Children will often say, "The marble fell out of the cup." Remind them that the cup and marble represent a car and driver by saying, "Yes, I fell out of my car."
5. Ask for suggestions on what you could do to stay safely in your car if the situation ever comes up again. Many children say "Close the door!" meaning close the open end of the cup. Put your hand over the opening and move the car back and forth vigorously to show that the marble still moves inside the cup just as a person inside a car would.
6. Refine the question by saying, "In real life—not pretend—how can we make sure that we don't keep going when our car stops? What holds us safely in the car and in our seats if we have to stop the car very suddenly?" Children usually say, "Put on your seatbelt!"

7. Put a piece of masking tape across the marble still inside the cup. Move and stop the cup quickly to show how the "seatbelt" keeps the marble (driver) in the car.
8. Have all the children use a cup and marble as a car and driver model, first with and then without a seatbelt.

Children do not hesitate to crash their car-cups into each other. Their smiles and quick glances at the teacher show that they know they are representing a dangerous action, safe to do only with the cup-as-car models. After "falling out of their car" a few times, most ask for a piece of tape to use as a seatbelt. A follow-up discussion could ask, "When else have you seen objects continue to move once their carrier has stopped?" Some examples include groceries on a check-out conveyer belt, people on a sled that is stopped by a snowdrift, paint on a Spin Art turntable, and items on a lunch tray that is pushed too quickly along the line.

The Early Years

## What's happening at *http://science.nsta.org/earlyyearsblog.*

### How do you address "physics phobia"?

The science goal when working with young children must focus on skills and not on (accurate) content. Early inquiry skills (mixing, pushing, watering, etc.) and process skills (observing, classifying, inferring, predicting, etc.) should be the focus of physics teaching and learning. The objects and relationships of physical phenomena explored then can be moving objects, falling objects, static electricity, etc. without the fear of getting something wrong. The teacher's role is to ask probing questions, getting students to respond to questions, getting students to continue exploring more deeply. That is a successful physics teacher of young children.

*Dennis Sunal*
*Professor, Science Education*
*University of Alabama*

A really fun and easy way to introduce some physics into the early childhood classroom is to put out lots of materials for children to make ramps for toy cars. You can encourage them to explore variables by asking a few key questions. Does the car go faster on the board or on the foam ramp? If the ramp starts higher does the car go off the end farther? How can you keep track? What happens if you tape something to the car to make it heavier? Does it change the speed of the car down the ramp? Does it change how far off the end it goes? You could keep a chart posted for the trials and children will keep trying out new ideas.

*Sara Davis*
*Associate Professor, Early Childhood Education*
*University of Arkansas Fort Smith*

Online, your colleagues are talking about:

- Stretching Resources

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## Teacher's Picks

Peggy Ashbrook

Preschool science teacher Peggy Ashbrook supports children's desire to be in motion.

### Books

*ABCDrive!: A Car Trip Alphabet*. Naomi Howland. 1994. Clarion Books.
*Alphabeep: A Zipping, Zooming ABC.* Debora Pearson. 2003. Holiday House, Inc.
*Are We There Yet, Daddy?* Virginia Walters. 1999. Viking.
*A Drive in The Country*. Michael J Rosen. 2007. Candlewick Press.
These four books—ABC collections of vehicles and stories of families riding in cars—have illustrations showing adults and children wearing seatbelts. A search game can be made for illustrations where a child is riding in the front seat or other hazardous behavior.

*The Ball Bounced*. Nancy Tafuri. 1989. Greenwillow Books.
*Wheel Away!* Dayle Ann Dodds. 1991. HarperCollins Childrens Books.
These two books for the youngest children show a ball and a wheel in motion, staying in motion until acted on by an outside force.

*Amazing Science: Tires, Spokes, and Sprockets—A Book About Wheels and Axles*. Michael Dahl. 2006. Picture Window Books.
*Forces Make Things Move (Let's-Read-and-Find-Out Science 2).* Kimberly Brubaker Bradley. 2005. HarperTrophy.
These nonfiction books about motion can be used as a refresher for teachers or a further exploration for students.

### Internet

Transportation Safety Tips for Children, the National Highway Traffic Safety Administration
*www.nhtsa.dot.gov/people/injury/childps/newtips/index.htm*
A set of 11 topics, including riding in a car, bus, on a bike, and walking, these pages fully describe the rationale behind using different car seat restraints at different ages and describe child development, such as, "Children can't judge speed and they think cars can stop instantly." Copy the pages to share with the families of your students.

Booster Seat Flyers, The Washington State Booster Seat Coalition
*http://depts.washington.edu/booster/educational_materials.html*
Download these free one-page informative flyers to raise awareness about booster seat basics (Available in many languages).