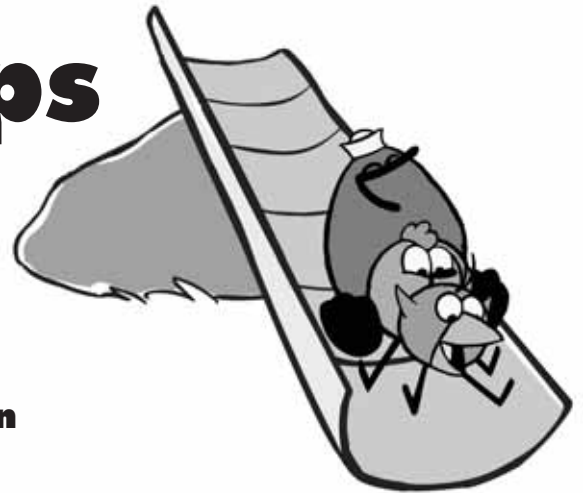


Unit 6

Explore Ramps



2 Learning Goals

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Gather materials and books for your exploration of ramps.

6 Roll Up Your Sleeves! Teacher Preparation

Explore the science behind ramps and plan your curriculum by trying out the materials your kids will use.

10 Let's Explore: Outdoor Ramps

Head to your playground or outdoor play area. Explore slides, hills, and other outdoor ramps and inclines. Notice how different surfaces affect the way a ball rolls

16 Let's Explore: Indoor Ramps

Pick an object to place on a ramp. Does it roll, slide, or stay put? Build ramps and tracks from pieces of cardboard and wood, as well as tubes and hoses. Experiment with changing the steepness of the incline.

26 Teacher Reflection

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Classroom Close-Up

Welcome to Kira's classroom! Find out how she and her kids explore ramps and rolling objects. Look for stories, drawings, and photos from Kira's classroom throughout this exploration unit.



Photo: Kate Adie



PEEP and the Big Wide World Online Video

To watch the animated *Peep* story *The Whatchamacallit* and the related **Kids Explore** video clips, go to the *Peep* Explorer's Guide section in the Resources area of the *Peep* Web site: peepandthebigwideworld.org. You can watch the videos with English or Spanish audio.

Peep Story: *The Whatchamacallit* 8:45 minutes

Kids Explore: *Building Ramps* 1:30 minutes

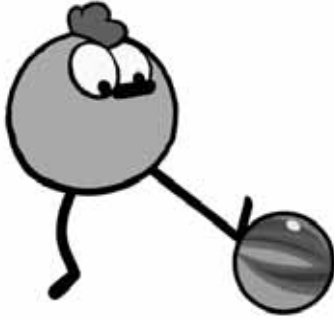
Kids Explore: *Rolling Down a Hill* 1:30 minutes



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Learning Goals

Classroom Close-Up

The block corner is a very active part of my room. My students build structures with wooden blocks, Legos, etc. The other day I noticed that Ari was adding a ramp to his structure saying, “This is an exit for my animal to leave the barn.” I took a photo of the building and we put a fence around it to keep it intact.

At Circle Time, we all went over to the block corner to take a look the barn ramp, and I encouraged Ari to talk about why and how he constructed it. It really helped launch our class exploration of ramps.

—Kira, preschool teacher

Science

As children explore inclined planes (ramps), they will begin to understand the following **key science concepts**:

- A ramp, or inclined plane, is a surface with one end higher than the other.
- An object placed on an inclined plane will roll, slide, or stay put.
- The shape of an object affects whether it will roll or slide or stay put.
- Objects that slide are more likely to move on steeper inclines, and both rolling and sliding objects move faster down steeper inclines.
- The motion and speed of a rolling or sliding object is affected by the texture of the object and the texture of the surface on which it is rolling or sliding.
- When a rolling ball hits an obstacle, it will stop or slow down and its direction may change.
- When a stationary object is hit by a rolling ball, the force may knock the object over or cause it to move depending on how fast the ball is going and how heavy it is.

Kids will practice **scientific skills** as they learn about ramps and rolling objects. They will:

- **Observe** and **describe** the way objects move when they are placed on ramps of different steepness, when they leave the ramps, and when they hit other objects.
- **Predict, sort,** and **compare** the behavior of objects that roll versus objects that slide.
- **Predict, measure,** and **compare** how different objects roll on different surfaces.
- **Measure** and **compare** the distance an object rolls after it leaves the ramp as children increase the steepness of the ramp and use different balls.
- Do **simple experiments**, talk about **cause and effect**, and **share ideas**.



Language and Literacy

Vocabulary

- Through hands-on experiences and discussions, children will become familiar with nouns such as *ramp*, *incline*, and *obstacle* and action verbs such as *roll*, *slide*, *bounce*, and *swerve*.
- They will also hear and use descriptive words, such as *steep*, *less steep*, *smooth*, *bumpy*, *round*, *flat*, *heavy*, *light*, *hard*, *soft*, *far*, *farther*, *more*, and *fewer*.
- Inquiry verbs will be an important part of the science conversations about ramps, rolling, and sliding. These verbs include: *watch*, *observe*, *predict*, *measure*, *count*, *compare*, *sort*, *describe*, *identify*, *share*, *notice*, *discover*, and *question*.

Print awareness—Children will see their words written on class charts. They'll listen and “read” along as the words are read back to them.

Book experiences—Children will listen to read-aloud books about ramps and rolling and explore books independently.

Emergent writing—Children will draw and write about their ramp constructions and their experiments and discoveries.

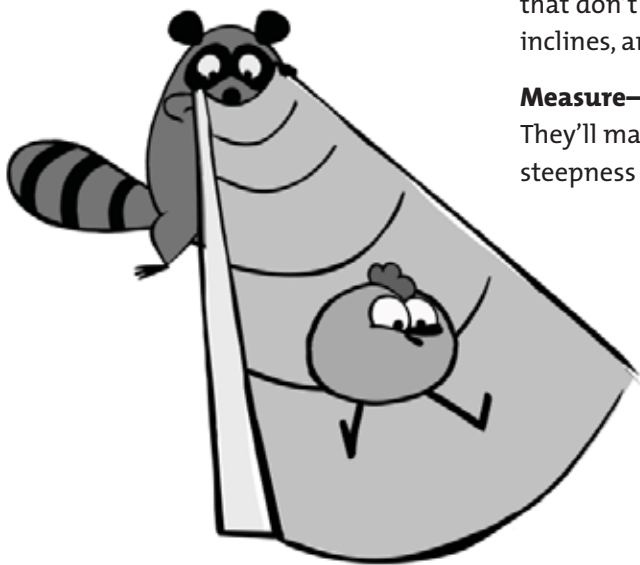
Early Math

Count—Students will count blocks as they increase the height of a ramp (one block high, two blocks high, three blocks high...).

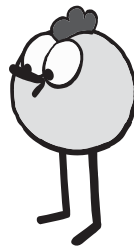
Categorize—Children will test and sort objects into groups, for example: objects that roll and objects that don't roll; objects that have at least one flat side and objects that don't, objects that roll or slide straight and objects that don't, etc.

Compare—Children will compare the shapes of objects that roll and objects that don't roll. They will compare the steepness, length, and texture of various inclines, and identify objects that are bigger or smaller, heavier or lighter.

Measure—Children will compare the distance balls roll on different surfaces. They'll mark and compare the distance a ball rolls each time they increase the steepness of the ramp.



Classroom Resources

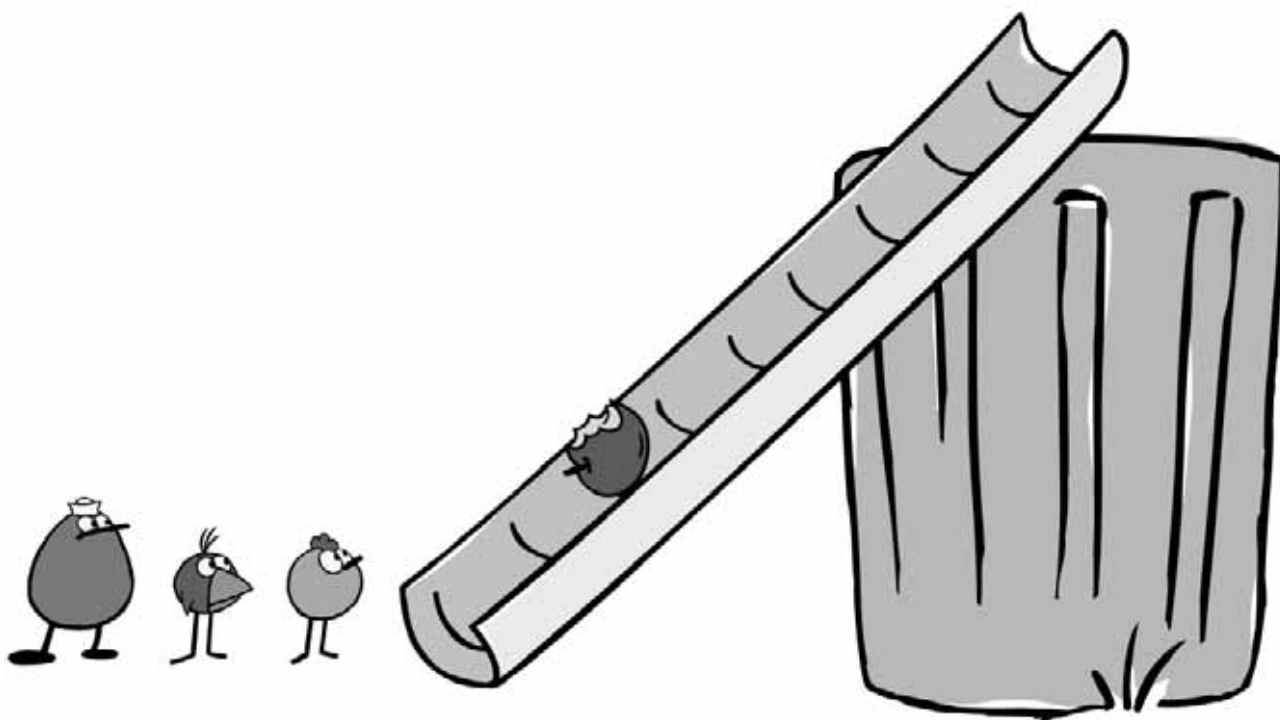


Gather supplies for Unit 6: Explore Ramps. We have provided a list of **all the materials you'll need**. Then, gather **ramp-related** books for your classroom. They will help spark kids' curiosity, introduce some new information, and generate new ideas for science play.

Materials

Collect materials for making ramps, and gather objects that can roll or slide down those ramps. Find balls and marbles that are the right size to fit the tubes and hoses you have gathered.

- a variety of balls, different sizes and weights—beachball, kickball, tennis ball, ping pong ball, wiffle ball, golf ball, football, etc.
- large marbles
- a collection of nonspherical objects that roll or slide down ramps, for example, a roll of tape, eraser, marker, stuffed animal, blocks
- toy cars (optional)
- flat pieces of cardboard, foam core, and/or wood
- cardboard tubes of different lengths—paper towel, toilet paper, wrapping paper, mailing tubes. Cut some of the tubes horizontally to form open troughs.
- wide, flexible hoses from shop vacs or sump pumps. (Look for these in the plumbing section of hardware stores.)
- PVC pipe, pieces of gutter, wooden trim (the ones with a trough in the middle keep balls nicely in the track!). (You can find these in stores like The Home Depot.)
- boxes, building blocks, and other objects for supporting the ramps
- camera (for taking pictures of your young scientists and their constructions)
- pencils, crayons, markers, paper, and clipboards
- collage and 3-D materials: craft sticks, yarn, circle-shaped stickers
- masking tape





Picture Books...with Extension Activities

There are lots of great kids' books related to ramps. Rather than use these books to introduce the unit, we suggest that you share them with your class *after* children have had some hands-on experience with identifying, describing, and experimenting with ramps themselves. That way children bring greater prior knowledge to the reading and can make richer connections between their own experiences and the ramps-related information in the books.

- Cowen-Fletcher, Jane. **Mama Zooms.** Scholastic, 1996.
A little boy spends busy days zooming up hills, down ramps, and around town with his mom, on her wheelchair. After reading this book to your kids, take a walk around your school and playground. Which areas are accessible to people in wheelchairs? Look for ramps and other features that make it accessible or not.
- Dahl, Michael. **Roll, Slope, and Slide: A Book about Ramps.** Picture Window Books, 2006.
From skateboard parks to highway ramps, this book takes a look at the many ways we use ramps every day. After reading the book, set a challenge for kids in the block corner. Can they construct a way for toy cars to drive up onto bridges built from blocks or drive down from a second-floor parking garage?
- Kimmel, Eric. **The Runaway Tortilla.** Winslow House, 2000.
A tortilla rolls away from a man and a woman, two horned toads, three donkeys, four jackrabbits, and five rattlesnakes in this variation on The Gingerbread Man folktale. After sharing the book with your students, talk about the shape of a tortilla. What other types of foods could roll away the way the tortilla does in this story? Can your class make up a story about one of these foods escaping from your classroom at lunchtime?
- Soto, Gary. **The Old Man and His Door.** Putnam, 1998.
Also available from Putnam in Spanish: *El viejo y su puerta.*
The old man in this story uses his door as a ramp to help workers load heavy furniture into a moving van. After reading this book, hold a class brainstorm: How could you use the old man's door in your classroom or playground?



Nonfiction Books

You and your students can use these books to get factual information about ramps and rolling objects. It's a great way to model to kids how books can be helpful resources for learning about their world. Kids can also independently look at the books as part of their explorations.

- Bradley, Kimberly. **Forces Make Things Move.** HarperCollins, 2005.
This book uses familiar examples, such as throwing a ball, pushing a toy car across the floor, and running up stairs to help children explore and understand the concepts of forces, friction, and gravity.
- Whitehouse, Patricia. **Rolling.** Heinemann Library, 2003.
(Also available in Spanish.) This book invites your students to try a number of simple experiments with everyday objects that roll.



Roll Up Your Sleeves!

Teacher Preparation



Photo: Claudette Dawes

When was the last time you played on a slide? Here's a chance for you to revisit the fun, because a slide is just a big ramp. So grab a teaching partner, or a willing friend, and explore ramps together, both outdoors and in your classroom.

These hands-on activities will help you:

- **discover new things** about ramps and the way things roll or slide down ramps and other inclined planes
- **make observations** about how things roll and slide in different environments and situations

They will also help you to:

- **think about** ways you can help your kids get the most out of their ramps and rolling explorations: vocabulary you might introduce, questions you might ask, and ways that children can represent their discoveries
- **troubleshoot** problems that may arise when the children use the materials

Teacher Reflection



As you explore, reflect on how you could best introduce and adapt these activities to suit your students and your environment. The questions below are intended to spark those reflections.

Classroom Close-Up

My co-teacher and I went outside to explore our play area. At first I felt discouraged, “There’s nothing here to encourage ramp exploration.” Then I thought a little more and realized we have wonderful grassy hills that we can roll things down—including ourselves! And we have a couple of slides on the playground. The kids can gather pebbles, sticks, pine cones, and dead leaves and we can see what happens when we place them on the slide.

—Kira, preschool teacher

Outdoor Ramps

Gather several balls of different weights and sizes (including marbles); small classroom objects, such as a marker, building blocks, and chalkboard eraser; cardboard tubes, PVC pipes and/or flexible hoses; some boxes; lengths of cardboard or wood (for building ramps); and a clipboard, paper, and pencil for taking notes. Then head outside!

Survey the Possibilities

- 1 Walk around your outdoor play area and search for ramps and other sloping surfaces. Check out playground equipment (slides, seesaws, roofs on playhouses, etc.). Do you have a sandbox in which you could build a hill of sand? Look for paved walkways, grassy and not-so-grassy hills, access ramps to the building, etc.
- 2 Not sure if a paved area is flat or inclined? Try placing a marble or ball on the surface and see if it rolls downhill.



Which areas are safe for rolling balls and other objects? How might you create a barrier so balls do not roll too far?



Roll, Slide, or Stay Put?

- 1 Gather some small outdoor objects (a stick, a pinecone, a stone, etc.). What do you think will happen when you put each object on a slide (or other inclined surface)? Will it roll? Slide? Stay put? First, make a prediction, then try it out. Try each object several times. Does it always move the same way? (For example, what difference does it make if the stick is pointing down or pointing across the incline?) Discuss any surprises with your partner.
- 2 Continue the experiment with your collection of small classroom objects. Include several balls and a cardboard tube.
- 3 Sort the objects into groups: those that rolled down the incline, those that slid, those that both rolled and slid, and those that stayed put. What is similar about the objects in each group? What words would you use to describe their shape, texture, rigidity or floppiness, etc.?



What do you think the children will notice? How might you record the words they will use? What open-ended questions might you ask that will help them focus on the characteristics of the objects and how the objects are moving?

Explore Different Surfaces

- 1 Try to find a paved area or walkway that slopes downward—if possible, one with grass or dirt next to it. Place a ball on the paved surface and let it roll downhill. How far does it go? What do you think causes it to stop?
- 2 Place the same ball on the grass or dirt next to the pavement. How far does it roll on this surface? What do you think makes it stop? If you have two similar balls, you can try “racing” them on the two surfaces. What words come to mind as you try to describe the movement of the balls?
- 3 What happens if you change the surface texture of the dirt or grassy area by placing a large piece of cardboard or plastic on top and then letting a ball roll down? How does the movement compare to the ball rolling down the paved surface?



What materials would you want to make available when you do this exploration with your kids? How could you help kids record and compare how far a ball rolls on each surface?

Teacher Tip

If you don't have inclines outdoors, kids can still explore the way things move on different surfaces by rolling the balls on flat surfaces. Have them try rolling different balls on different surfaces (pavement, grass, dirt, or pebbles) to decide which surfaces and which balls are best for a game of bowling.

Explore Different Balls

Try rolling balls of different sizes and weights down paved ramps and grassy hills. What do you notice? Think about the vocabulary you are using to describe the balls themselves and how they are the same or different.



Build Ramps

Outdoors can be a great place to build large-scale ramps for balls. Use cardboard tubes, flexible hoses, pieces of gutter, wooden trim or planks, PVC pipes, etc. to build a long track for a ball to roll down. What adjustments do you need to make so that a ball rolls all the way from one end to the other?

For an added challenge, try building a track where the ball rolls uphill for a short stretch. What do you have to do to the track to get the ball to roll to the end? Or find a way to incorporate a playground slide or hill into your track construction.



How might you engage children in building a large-scale track? What materials would you provide? What practical help might they need?

What do you think children will experience and learn from this activity?

What words do you think children will need or want to know in order to talk about their construction and share their discoveries?

What are some ways you could help children document what they have built and what they have discovered? For example, they might draw, or create a collage, or build a 3-D representation of their construction using craft sticks or yarn to represent the ramps, and circles or stickers to represent balls.

Indoor Ramps

Roll or Slide?

- 1 Put a piece of foam core or cardboard on the floor and place a small object in the center. Experiment to find out how much you need to slant the foam core or cardboard before each object starts to roll or slide. What do you notice? Try this with a number of objects, noticing which ones roll and which ones slide. What is it about the object that affects how it moves?
- 2 Note that a marker will *roll* if it is placed sideways across the ramp, but it will *slide* if it is placed pointing down. Can you find other objects like this? What happens if you place those object diagonally across the ramp?



What do you want the children to notice? What objects will be most interesting for them to experiment with? What language might you model and encourage children to use with this activity?



Unusual Ramps

- 1 Your legs can make a good ramp for a rolling ball. So can other parts of your body. See how many different “body ramps” you can build.



What do you think children will experience and learn from this activity? How do you think this activity would work best in your classroom—as a whole group, small group, or partner activity?

- 2 Try using a long, wide, flexible hose as a ramp (see Materials). Use a large marble as your ball. What new possibilities do these materials introduce into your exploration of ramps? For example, see what happens if you make the bottom end of your ramp curve up.



How do long flexible tubes lend themselves to partner work? What sort of games can you and your teaching partner create?

Less Steep and Steeper

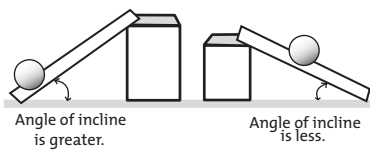
For these explorations, you will want to have enough space in front of the ramp for the ball to stop rolling on its own. A hallway, for instance, is a great place to set up a ramp for rolling balls.

- 1 Explore how far a ball rolls as you gradually increase the **steepness of a ramp**. Get several equal-length pieces of cardboard or foam core to use as ramps and a supply of equal-size building blocks. Build a series of ramps side by side. Prop the first ramp up on one block, the second ramp on two blocks, etc.
- 2 Try rolling a ball or tube down each ramp to see how far it goes. To make this a fair test, and control for all the variables, it's important to just release the ball at the top of the ramp—don't give it a push. To ensure that you release the ball from the same place each time, you can draw a start line at the top of the ramp and use a ruler as a starting gate. (Set the ball behind the ruler, then lift the “gate” and let the ball roll.)
- 3 Set yourself a challenge. Try to get a ball to roll down a ramp and stop at a certain point on the floor. Adjust the steepness of the ramp until you get it to stop at that point.
- 4 Place an obstacle, or a row of obstacles—such as a tower of small blocks, a paper or plastic cup, or toy cars—a short distance from the end of one of your ramps. Roll a ball down the ramp. What happens when the ball hits these obstacles?

Ramp Science

Angle of Incline

The steeper a ramp becomes, the more quickly an object will roll or slide down the incline, and the farther it will roll after leaving the ramp. As seen in the diagram below, a ball rolling down the steeper ramp (the one propped on the taller box) will travel farther than a ball rolling down the less steep ramp.



You can extend this into an investigation by changing one variable and observing the results.

- Change the steepness of the ramp. Let the ball roll down and hit the obstacles. How does the steepness of the ramp (and thus, the **speed of the ball**) make a difference?
- Use a heavier and a lighter ball on the same ramp. Let the balls roll down and hit the obstacles. How does the **weight of the ball** make a difference?



Let's Explore Outdoor Ramps

Ramp Science

Knocking over obstacles

A ball's ability to move or knock something over depends on momentum. The momentum of a ball depends on how fast the ball is going and how heavy it is. If two different balls are rolling at the same speed, the heavier ball has more momentum. If two balls that are the same weight are rolling, the ball that is rolling faster has more momentum.

Many science concepts related to ramps and the way objects move on ramps can be explored both indoors and outdoors. Outdoor explorations allow children to use ramps they can find outside (hills and slides, for instance) and give them the opportunity to roll objects on surfaces such as grass, sand, blacktop, and pebbles. Outdoors, children also have the room to build big tracks for rolling balls.

Outdoor explorations also invite children to become more aware of inclines and ramps that exist in their environment, for example, a slight slant of the playground pavement that makes balls roll downhill, a cut in the sidewalk that allows baby carriages and wheelchairs to roll from sidewalk to street, or a slanted roof that allows rainwater to roll off. These observations can lead to great discussions about the practical, everyday uses of ramps.

Introduce Ramps

Before going outside, ask children about their experiences with slides.

- What sort of slides have you been on? What does it feel like to slide down a slide?
- What other experiences have you had sliding down something other than a slide?
- What do you think makes you slide faster or slower?
- Have you ever put anything on a slide to see if it would slide down? Tell us about it.

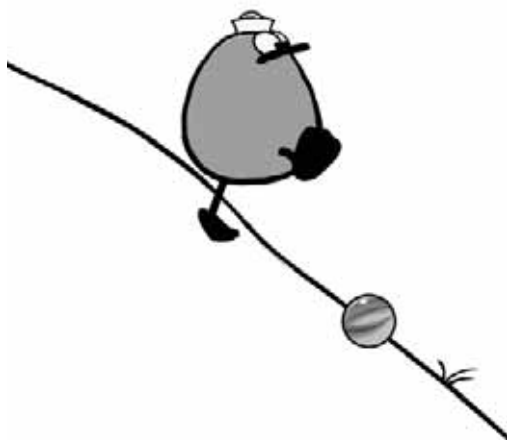
Write down the children's ideas. If you have an older, more sophisticated group, you might want to show the kids a small collection of objects that you have gathered (a stick, a leaf, a pebble, a ball, etc.) and ask them to predict what will happen when each object is placed on the slide. Write down their predictions.

Go out to the playground and invite children to join you in sending the objects, one by one, down the slide. Encourage children to describe and imitate (with their hands and bodies) the way the objects move. Bring along a clipboard, and jot down the things the children say and do.

Reflect and Share



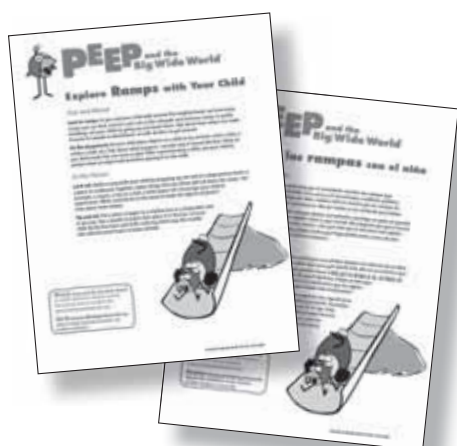
When you return to the classroom, invite children to talk about their experiences at the slide. Use your notes to share examples of what various kids said and did, and encourage other children to share their own similar (or different) experiences and observations.



If children previously made predictions about how each object would move on the slide, revisit these and compare them with what actually happened.

If the class previously listed things they knew about slides, review those ideas and encourage children to add some new things about slides and the way things move on slides.

Let children know that in the coming weeks they will be exploring the way things roll and slide down ramps and hills, both indoors and outdoors. They will also be drawing and writing about their discoveries and ideas.



Family Science Letters

Reproduce and send home “Explore Ramps with Your Child” (provided in English and Spanish). You will find the Family Science Letters in the *Peep Explorer’s Guide* section in the Resources area of the *Peep* Web site:

peepandthebigwideworld.org. During future Circle Times, encourage kids to talk about the ramp experiences and discussions they have had at home.

Free Exploration

Materials

- a variety of balls and other objects that roll or slide
- materials to build ramps: lengths of cardboard and wood, cardboard tubes (paper towel and wrapping paper tubes, mailing tubes, etc.), PVC pipes
- boxes and other objects for supporting the ramps
- camera
- drawing supplies

Allow kids to freely explore ramps outdoors, without specific direction. You may want to start by inviting them to roll objects down existing outdoor ramps (slides and hills). If you have safe, grassy hills, invite kids to roll down those hills themselves. Later, if you wish, you can provide them with materials for building their own ramps, choosing locations that are safe for rolling balls.

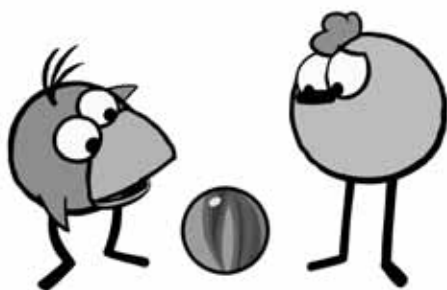
Observe the children at work, noticing what captures their attention. At times, you may want to engage them in conversation, asking them to talk about what they are making or doing and/or what they are noticing and wondering. Take photos and encourage kids to draw pictures and write about their experiences and constructions. Provide opportunities at Circle Time for children to share their experiences and discoveries with the class.

After children have had plenty of time to freely explore the materials, engage them in the guided ramps activities, both outside and inside, described in the following pages. Your science exploration of ramps can be spread over 3–5 weeks, or as long as students’ interest continues.



Photo: Claudette Dawes





Explore Outdoor Ramps: Guided Activities

The guided activities in this unit, both indoor and outdoor, engage children in observation, experimentation, discussion, and problem solving related to aspects of ramps and the way objects move on ramps. As you guide children through these activities, explore alongside them, and model scientific skills and attitudes like curiosity, concentration, and persistence. Ask open-ended questions that encourage children to observe closely and reflect on cause and effect. Whenever possible, help them make connections to the discoveries they have made in Free Exploration or in other guided activities.

Key Science Concept



- A ramp, or inclined plane, is a surface with one end higher than the other.

Classroom Close-Up

When we went outside today I gave each student a clipboard and pencil. As we searched for ramps and inclined planes around our school, the students began to see:

- a man in a utility truck being held up by a slanted arm
- access ramps
- railings
- a sidewalk that descends into the street

An event tent was being set up across the street, and some students pointed out that the slanted roof was a “ramp.” We sat in the shade and drew pictures of the ramps that we saw.

—Kira, preschool teacher



Activity

Ramps All Around

Notice ramps and slanted surfaces in the world around you.

Vocabulary: Introduce, use, and reinforce the words *ramp*, *inclined plane*, *slanted*, *up*, and *down*.

Materials: pieces of cardboard or foam core or wood; cardboard tubes, some split horizontally to form troughs; boxes or blocks to prop up ramps; drawing materials and clipboard

- 1 Provide ramp building materials and let children construct some ramps. Examine the structures together. Ask children, *What is a ramp? Which of these structures are ramps? How do you know?* During your discussion, introduce another term for ramps—*inclined planes*.
- 2 Go for a walk around the schoolyard or neighborhood looking for inclined planes or slanted surfaces. Take paper, pencil, and a clipboard so you can keep a list of inclined planes or ramps that the children see. You may also want to take photos of the items the children spot.
- 3 Provide materials so children can draw the ramps they see.

Reflect and Share



Review the list (and pictures) of slanted surfaces the children spotted. Encourage children to consider the purpose of some of the inclined planes, such as roofs, entrance ramps, and sidewalk cuts. What can roll up (or down or off) those ramps? Urge children to keep an eye out for additional inclined planes. Add new items to the list throughout the unit.





- An object placed on an inclined plane will roll, slide, or stay put.
- The shape of an object affects whether it will roll or slide or stay put.
- The motion and speed of a rolling or sliding object is affected by the texture of the object and the texture of the inclined plane.

Activity **Roll or Slide?**

Discover whether an object rolls, slides, or stays put.

Vocabulary: Introduce, use, and reinforce the words: *roll, slide, predict, describe, test, sort, alike, similar, same, shape.*

Materials: Objects to send down the slide, including some that will roll and others that will slide, for example: a chalkboard eraser, a variety of balls, a piece of cardboard, a toilet paper roll, a square or rectangular building block. Bring several additional objects for the “predict and test” activity at the end of this session: an orange, a small box, a football, a triangular and a cylindrical wooden building block.

- 1 One by one, send the first group of objects down the slide. Encourage children to describe how each object moves: Does it roll? Does it slide?
- 2 Pose questions to encourage children to describe, predict, and investigate further, for example:
 - *How did the (block) move when we sent it down the slide? What else did you notice?*
 - *If we send the block down the slide again, what do you predict will happen? (Try it and discuss.)*
- 3 Based on your observations, help kids sort the objects into two groups: **things that roll** and **things that slide**. Pass around the objects in each group for children to handle and examine. What do kids notice about the shape and texture of the things that roll? The shape and texture of the things that slide? The shape and texture of the things that stay put?
- 4 Bring out the objects in the second group (see Materials). Invite children to predict whether an object will be something that rolls, something that slides, or something that stays put. Why do they think that? Send each object down the slide and see if the children’s prediction was correct.
- 5 Do some more explorations with the things that stayed put. What do children notice about the shapes and textures of these objects? Try to find other inclines that these objects will slide or roll down. What’s the difference between these inclines and the slide?

Classroom Close-Up

We used our slide to find out how different objects would move when placed on a ramp. We used Popsicle sticks, a pen cap, ping pong balls, rubber balls, marbles, an eraser, and a penny. The kids sorted the objects into two groups—the ones that rolled and the ones that slid. The eraser caused some discussion, because it slid a little bit and then stopped. Zoe, the student who sent it down the slide, suggested an explanation: “The eraser is made out of rubber, so that is why it stopped and didn’t hit the bottom of the slide.”

—Kira, preschool teacher





Online Video: The Whatchamacallit

Peep, Chirp, and Quack discover the thrill of zipping down a slide—quite accidentally!

Peep Video Connection

Teacher Tip. Watching and discussing the animated *Peep* story and related live-action clips can spark and extend children’s interest and understanding of ramps and the way things move on ramps. We suggest that children watch the *Peep* video clips after they have had an opportunity to do their own initial exploration of ramps. Your children can compare their experiences and discoveries with those shown on the video clips and think about what additional ramp explorations they might like to try.

Watch and discuss the animated *Peep* story, *The Whatchamacallit* (8:45 minutes). This video is found in the Resources area of the *Peep* Web site (peepandthebigwideworld.org/resources). Go to the *Peep Explorer’s Guide* section. You can watch the video in English or Spanish.

After watching, ask children:

- How did the long straight gutter pipe in the story become a slide?
- Have you ever tried walking up a slide like Peep, Chirp, and Quack did? What did it feel like?
- Is it easier to go up a slide or down a slide? Explain.
- What ideas did you get from the video for new ramp experiments you’d like to try?

Key Science Concept



- The motion and speed of a rolling or sliding object is affected by the texture of the object and the texture of the surface on which it is rolling or sliding.

Activity

Ramps with Different Surfaces

Compare how an object moves on two different inclined surfaces.

Vocabulary: Introduce, use, and reinforce terms such as *incline*, *ramp*, and *surface*, and descriptive words such as *faster*, *slower*, *steep*, *less steep*, *bumpy*, *smooth*, *rough*.

Materials: several balls, a camera (optional)

- 1 Explore the way a specific ball moves on inclines with different surfaces, for example, a grassy hill, various concrete ramps or inclines, a playground slide, a sandhill in the sandbox. This ramp exploration is an interesting way for you and the kids to investigate your own outdoor space; are there inclines you hadn’t noticed before? Places you didn’t even know were inclined until you saw that balls rolled a certain way?
- 2 Encourage children to describe and compare the texture and the steepness of each surface. Ask:
 - Does the ball roll faster/farther when you send it down the grassy hill or the concrete ramp?
 - What do you think is different about the (concrete ramp) that makes the ball roll faster?



- 3 Repeat this experiment with different balls or other rolling objects. If possible, take photos to document the children's experiences.

Note: Even if you don't have inclines outdoors, you can investigate different outdoor surfaces for rolling. Which surface would be the best for playing a game of bowling? Why do you think that is? Try it and see!

Extension Idea. What happens if children change the surface of an incline by placing plastic or cardboard on the grass or concrete hill, by placing a cardboard tube on the sandhill, or by placing a towel on the slide? Invite children to mark the distance a ball travels down a grassy slope and compare that to the distance it travels when a piece of cardboard is placed on top of the grass. Does the grass slow down all balls the same way, or do the characteristics of the balls seem to make a difference? How?

Reflect and Share

At Circle Time, display the photos from the outdoor exploration.



Encourage children to dictate words to go with the photos, explaining what they did, what they observed, what they discovered. You can post the photo essay on your wall or bind it into a book for your class library.

Peep Video Connection

Watch and discuss **Kids Explore: Rolling Down a Hill** (1:30 minutes). The video clip is found in the Resources area of the *Peep* Web site (peepandthebigwideworld.org/resources). Go to the *Peep Explorer's Guide* section. You can watch the video in English or Spanish.

- *In this video clip, what are some of the things the kids try to roll or slide down the hill?*
- *What other surface do they roll things down? How is that different than the grassy hill?*
- *How does this video remind you of rolling and sliding explorations we have done outside?*
- *What ideas does the video give you about new explorations we might want to try?*



Online Video: Rolling Down a Hill

Kids roll things down a hill and make some interesting discoveries.



Classroom Close-Up

We rolled balls down both our concrete walkway *and* the grass right next to the walkway. We had soccer balls, wiffle balls, tennis balls. We wanted to compare how the balls rolled on the concrete and on the grass, and then figure out which ball went the farthest. Here are some of the observations the kids made as we experimented:

The ball won't roll, the grass is in the way.

The concrete is better.

The grass is taller, the concrete is flatter.

The grass pushed the ball and it stopped.

If the grass was shorter it would roll. We should we cut it!

The soccer ball went farther because it's bigger and a big circle.

Later when we were in the playground, one of the kids pointed out that our two slides have different surfaces—one is smooth and one is bumpy. We decided to send identical objects down the two slides. Aiden and Caleb used ping pong balls. We let the balls come to a natural stop and compared how far they rolled. Caleb announced, “The slide that has bumps—that ball went the shortest.” Zoe and Jack sent craft sticks down the slides. Zoe, who used the smooth slide, said, “Mine was faster because of the slide. Jack’s slide was too bumpy.”

—Kira, preschool teacher



Photo: Claudette Dawes



Photo: Kate Adie



Let's Explore Indoor Ramps

Indoor and outdoor exploration of ramps should happen simultaneously. Indoors, children will continue to observe and compare objects that roll, slide, or stay put, and to explore how the texture of a surface affects the motion and speed of rolling or sliding objects. Children will also investigate some new aspects of ramps in their indoor explorations. For example, they will explore how the steepness of a ramp affects how far a rolling ball or other object travels. They will also explore what happens when a rolling ball hits an obstacle.

Introduce Ramps

- 1 At Circle Time, place a small block on a piece of cardboard or wood in the center of the circle. Ask, *How can we get the block to move?* Let kids demonstrate their ideas and ask classmates to describe what they did: *Sam pushed the block. Aisha shoved the block with her foot.*

Now ask: *Without using our bodies, how can we get the block to move?* If a child doesn't introduce the idea of slanting the piece of cardboard so the block slides off, demonstrate this idea yourself. Ask children to describe the motion of the block. Does the block start sliding right away? Slant the cardboard slowly to show how far you need to slant it in order to make the block slide.

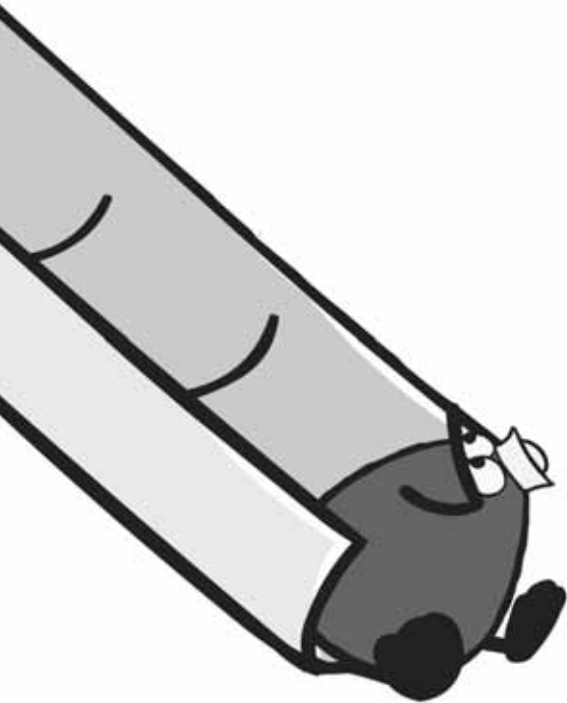
Repeat the activity, this time placing a ball on the piece of cardboard or wood. Ask children to suggest some different ways to get the ball to move. When a child slants the cardboard and causes the ball to roll, ask the class to describe what happened. Ask, *What was different about the way the block and the ball moved?* (This is a good time to introduce or review the words *roll* and *slide*.)

- 2 Hold up two identical pieces of cardboard and say, *Let's make these pieces of cardboard into slides. We'll need something to hold up one end. What can we use?* Let children suggest different things to support the slides (books, blocks, chairs, etc.).

Use the pieces of cardboard to make two slides or ramps, side by side, each supported by a different object. (You might want to introduce or reinforce the word *ramp* at this time.) Ask kids to compare the two ramps—how are they different?

Roll toilet paper tubes simultaneously down the two ramps, and talk about what happens. Does one toilet paper tube roll farther than the other? What made it go farther? Try "racing" the tubes again. Does the same thing happen?

Explain that, over the next few weeks, the class will be exploring ramps and things that slide and roll down ramps.



Free Exploration

Materials: Provide two sets of ramp-building materials. You may want to start with Set A. A few days later, set up Set B in a different location, so that kids can do explorations in both locations. Then you may want to combine materials from Sets A and B and add the materials in Set C. Other materials include a camera (for taking pictures of the children's constructions) and drawing materials (paper, pencils, markers).

Set A: Flat pieces of cardboard, boxes, and other objects to prop up the cardboard ramps; objects to roll down the ramps: toilet paper and paper towel tubes, markers, rolls of duct tape, balls of various sizes and weights, toy cars

Set B: Cardboard tubes of different lengths (mailing tubes are nice and sturdy) to serve as ramps—cut some of the tubes horizontally to form open troughs; boxes and other objects to prop up the tubes; balls small enough to roll through the tubes

Set C: Flexible tubing such as hoses from sump pumps or shop vacs—found in the plumbing section of hardware stores—cut into 4- to 6-foot lengths; craft sticks and balls (large marbles) that are small enough to roll through the tubing. Flexible hoses are great for partner and small group work. Two children can slant and manipulate a hose so that it forms an incline that a small ball or craft stick can roll or slide down.

Help children find a good area in which to build ramps, and then let them freely explore the materials. At times, you may choose to have children build the ramps facing a wall so that rolling objects will stop at the wall, or you may want to use a cushion as a bumper. However, noticing the distance objects roll after leaving the ramp is also an important aspect of exploration, so finding space and opportunities for kids to do this as well is valuable. Observe children at work, noticing what captures their attention. When appropriate, engage them in conversation, asking them to talk about what they are making or doing and/or what they are noticing and wondering.

Take pictures of some of the children's constructions so they can talk about them even after they are dismantled. It's also good to offer paper and pencils so kids can draw their constructions and represent the movement of the balls on them. Set aside time at Circle Time for children to share their constructions and discoveries with their classmates.

After children have had plenty of time to freely explore the materials, engage them with some of the guided ramp activities described in the following pages, but be sure to keep encouraging plenty of free exploration. Your exploration of ramps can be spread over 3–5 weeks, or as long as students' interest continues.



Classroom Close-Up

Sometimes the best lessons are unplanned. This morning I brought in a box of materials to launch our indoor ramp explorations. Micah, who was an early arrival, noticed the box and began to get to work. He set up tubes and sent balls down. As the rest of the students arrived, they joined him in sending different types of balls down the tubes, noticing how far they rolled. In these “races,” the tennis ball was always the “winner.” “Why do you think that is?” I asked. The students began thinking about how the objects were rolling and why they were stopping. One child said, “The tennis ball is the heaviest ball, it rolls slowly but goes far.” He had already generated an idea to explain what he was observing! What a great way to start our indoor ramps exploration!



Photo: Jem Sutton

Here are some of the tracks that the children came up with during Free Exploration.



Photo: Kate Adie

Zoe used foam board, blocks, and shoeboxes.



Photo: Kate Adie

Aiden used a classroom chair with cardboard tubes.



Photo: Kate Adie

Eli, Isabella, and Leon used blocks, cardboard tubes, shoeboxes, and foam board.

One group asked my co-teacher to help them shape the hose into a circle with a big marble trapped inside. The kids figured out how to move their arms to make the marble roll around the circle. It took real teamwork! The hose had ridges, and the marble made a cool sound as it rolled around the track. The kids could keep track of where the marble was by listening to the sound.

—Kira, preschool teacher



Photo: Kate Adie



Explore Indoor Ramps: Guided Activities

Key Science Concepts



- A ramp, or inclined plane, is a surface with one end higher than the other.
- Objects that slide are more likely to move on steeper inclines, and both rolling and sliding objects move faster down steeper inclines.



Activity Body Ramps

Can you make your body into a ramp?

Vocabulary: Introduce, use, and reinforce terms such as *ramp*, *roll*, *top*, *bottom*, *steep*, *steeper*.

Materials: toilet paper tubes; camera, drawing materials (optional)

- 1 Invite children to make their legs into a slide or ramp for a toilet paper roll or ball to roll down. As children demonstrate making their legs into a ramp—either from their knees to their feet, or their whole legs—place the tube or ball at the top of their “ramp” and let it roll down.
- 2 Encourage children to make another part of their body into a ramp. For example, they could use their arms or just their hands or their back. Have children work in pairs or small groups. Provide toilet paper rolls for children to roll down their classmates’ body ramps. Visit all the groups, taking photos and encouraging children to talk about their experiments.

Reflect and Share



Let children demonstrate and discuss some of their favorite body ramp inventions. Examine the photos together and ask: *What is a ramp?* *What do you notice that is the same about all these body ramps?*

Classroom Close-Up

Last week we asked the students to make their bodies into a ramp. We were indoors, and most of the students used chairs or shelves to make their body ramps. Today I wanted to see if the students could make ramps using only their bodies, so we went outside, away from everything. I put the children in pairs, and they began to make themselves into ramps and test out each other’s ramp with a ball or other rolling object. I asked them to draw their partner’s body ramp.

At first it was hard for the students to draw what they were seeing, but as we talked with the children about the shape and the slant formed by their partner’s body, they began to feel clearer and more confident about drawing it on paper. I was very impressed with the drawings—there were some really advanced representations of what the students saw. This was a perfect activity for my students, because they love to be outside, love to be with each other, love to move their bodies, and love to draw!

—Kira, preschool teacher



Photo: Jenn Sutton



Key Science Concepts



- An object placed on an inclined plane will roll, slide, or stay put.
- The shape of an object affects whether it will roll, slide, or stay put.

Classroom Close-Up

Before each child sent his or her object down the cardboard ramp, we predicted whether it would roll or slide. Then we discussed the results. Here are some of the students' discoveries:

The chalk rolls because it turns around like a wheel.

The square block is like a sled sliding down a hill.

Circles can roll more than other kinds of shapes.

I know why the triangle block slides. It's because it has corners, because it has flat sides.

—Kira, preschool teacher

Key Science Concept



- Objects that slide are more likely to move on steeper inclines, and both rolling and sliding objects move faster down steeper inclines.

Activity

Roll or Slide?

Explore the way different objects move when placed on a ramp.

Vocabulary: Introduce, use, and reinforce words such as: *roll, slide, ramp, steep, flat, round, same, different, sort.*

Materials: length of cardboard or foam core for each child to serve as a ramp; objects to prop up the ramps; small objects that will roll or slide: toy car, ball, glue stick, cardboard tubes, markers, blocks, binder clips, index card, small boxes, lids, bottle tops, etc.

This indoor “Roll or Slide” activity reinforces the outdoor “Roll or Slide” activity done at the playground slide. However, in this indoor version, all children have their own ramps and sets of materials, and thus have more control and input.

- 1 Gather sets of small objects to test out on cardboard ramps (see Materials). Help kids set up their ramps and try the objects out in a variety of ways. Encourage children to first predict and then describe how each object moves: Does it roll? Does it slide? How steep do they need to make the incline before the object begins to roll or slide? Have kids share and discuss their discoveries. Children may discover that an object such as a glue stick or pencil will roll if placed sideways, but slide if placed pointing down.
- 2 Have children sort the objects into two groups (they will probably need to test each object again): **objects that roll** and **objects that do not roll**.
- 3 Pass around the rolling objects so kids can examine and describe their shape and texture. Write the children's descriptions on a chart. Ask, *What is the same about all the rolling things?*

Then pass around the objects that do *not* roll for children to feel and describe. Again, record the children's words on a chart.

- 4 Hold up a specific object from each category and ask: *What makes the things that **don't roll** different from the things that **do roll**?*

Activity

Steeper and Steeper

Explore what happens to a rolling object when you increase the steepness of the ramp.

Vocabulary: Introduce, use, and reinforce words such as: *incline, roll, steep, steeper, faster, slower, farther, predict, count, how far.*

Materials: large marbles, small balls or cardboard tubes (from toilet paper or paper towel rolls); a number of identical ramps (cardboard, foam core or wood—18” to 24”); wooden building blocks (standard size) for propping up the ramps; craft sticks or other objects for marking the distance the objects roll



Note: Because you will be measuring the distance the ball or tube rolls, you will want to have enough space in front of the ramp for the rolling object to stop on its own. If you can build your ramps in a hallway or somewhere else with a long roll-out space, balls (which roll far) work well with this exploration. If you have limited space, paper towel tubes do not roll as far as balls, so they may be a better choice.

- 1 Before beginning this guided activity, be sure that kids have had plenty of experience building ramps on their own (Free Exploration). Tap into their prior knowledge and experience by asking them:
 - What did you notice about how the balls or tubes you used rolled down different ramps?
 - What did you do to get the balls (or tubes) to roll faster and farther?
 - What did you do to get the balls (or tubes) to roll slower and less far?
- 2 With the kids, build a ramp propped up with two blocks. Place a marble, ball, or tube at the top of the ramp and let it roll down. Mark where it stops.
- 3 Build a second ramp propped up on four blocks next to the first ramp. Ask kids how the two ramps are different. Have them predict how far a ball sent down the steeper ramp will travel. At the same time, send an identical ball down each ramp and mark how far each ball rolls.
- 4 Continue to build ramps of increasing steepness by propping them up on an increasing number of blocks. Each time, let kids predict how far the ball or tube will roll. Try it out and mark the distance.
- 5 Encourage children to continue this exploration on their own, working independently or in small groups.

Extension Idea Challenge kids to create an incline that will get the ball (or tube) to roll to a certain point on the floor or to roll into an open box placed on its side at a specific spot.

Reflect and Share



Gather children back together to share their experiences and discoveries. Ask, *What sort of ramp would you build if you wanted a ball to roll down the ramp and go really far?*



Photo: Jem Sutton

Nora and Madison announced, "Our ramp is steeper than Andre's!"

Olivia stopped by to critique. "The block in front of the ramp is going to stop the ball," she said.

Key Science Concept



- The motion and speed of a rolling or sliding object is affected by the texture of the object and the texture of the surface on which it is rolling or sliding.

Activity

Rolling on Different Surfaces

Explore how different floor surfaces affect how far a ball travels after leaving a ramp.

Vocabulary: Introduce, use, and reinforce terms such as: *surface, bumpy, smooth, farther, less far, bigger, smaller, heavier, lighter.*

Materials: two identical ramps or one very wide ramp, pairs of identical balls (for example: 2 tennis balls, 2 ping pong balls, 2 golf balls...), a rug, masking tape



- 1 If children did the guided activity **Ramps with Different Surfaces** (pages 14), have them recall the different surfaces that they experimented with outside (grass, concrete, etc.). Ask: *On which surface did the ball roll farther? Why do you think that was?*
- 2 Point out two contrasting floor surfaces in your room, for example, smooth tile and a rug. Have children feel and describe the two surfaces. Ask them to predict on which surface a ball would roll farther. Why do they think that is?
- 3 Set up two identical ramps (or one wide ramp) side by side: one on the smooth floor surface and one on a rug. Provide two identical balls. Say, “1, 2, 3, Go!” and let two kids gently release the balls so they roll down the ramps. Let the balls roll until they come to a natural stop. Have the class talk about what they notice and help them mark the distance each ball rolled.
- 4 Try the same experiment several times. Are the results the same or almost the same each time?
- 5 Encourage children to try the experiment with other sets of identical balls.

Reflect and Share



After several groups have experimented with the ramps on the floor and the rug, encourage children to report on what they observed, share their discoveries, and pose other questions that they want to explore. Have the ramps and balls available so children can demonstrate what they have learned.

Key Science Concept



- Objects that slide are more likely to move on steeper inclines, and both rolling and sliding objects move faster down steeper inclines.



Photo: Kate Adie

Activity

Build Trackways

Explore sending small balls down long trackways made of tubes and flat ramps.

Vocabulary: Introduce, use, and reinforce terms such as: *track, shape, incline, slant, steep, curve, faster, slower.*

Materials: flat ramps (cardboard, foam core, wood); tubes of different lengths and diameters (packing tubes, paper towel tubes, etc.)—some tubes can be left whole and others cut horizontally to make open troughs; flexible hoses from sump pumps or shop vacs; small balls or large marbles that will fit through the tubes; optional: tape

- 1 Have children build a long track for a small ball or large marble, using materials of their choice. Challenge children to change the shape and incline of the track so that a ball travels the whole length.
- 2 Encourage children to share their discoveries, talk about their challenges, and describe how they solved their problems. How did they change the shape of their track to make the ball travel the whole distance? What do they notice about the way the ball travels when it leaves the track, especially if the track curves up at the end?



Reflect and Share



Help children to record their observations, ideas, and questions. Take photos and encourage children to draw and write about their constructions.

Key Science Concept



- Objects that slide are more likely to move on steeper inclines, and both rolling and sliding objects move faster down steeper inclines.

Classroom Close-Up

We set a challenge for the kids: Build a long ramp for a hardboiled egg. See if you can get the egg to roll all the way down the ramp into a padded shoebox. The kids were really enthusiastic. They worked in teams. Some groups created really complex ramps. One child discovered that, depending on how you placed the egg, it would either roll or slide. When we used the PVC piping, we had to slide the egg down the track so it would fit, but on the cardboard ramps, we could roll the egg down.

—Kira, preschool teacher

Activity

Obstacle Course

Explore what happens when a ball rolls down a ramp and hits an obstacle.

Vocabulary: Introduce, use, and reinforce terms such as: *ramp* and *obstacle*; action verbs such as *roll*, *bounce*, *bump*, *swerve*; descriptive words such as *heavier*, *lighter*, *steeper*, *less steep*, *same*, *different*; and, science process verbs such as *observe*, *change*, *predict*, *record*, *document*, *chart*, *wonder*.

Materials: balls of various sizes and weights, ramps, objects to prop up ramps (books, blocks), objects to serve as obstacles (cardboard tubes, toy cars, blocks, pencils, etc.), clipboard and pencil or chart paper

- 1 Start with a fairly open exploration. Help children place a group of obstacles—such as paper tubes set upright (with objects balanced on top, if you wish), blocks, toy cars, or other balls—in front of a ramp, in the pathway of a rolling ball.
- 2 Talk about what happens when the ball rolls down the ramp and hits an obstacle. What happens to the obstacle? What happens to the movement of the ball? Does the same thing happen every time the ball rolls down the ramp? If not, why do they think it varies? Record the children's observations, ideas, and questions.
- 3 Then, get the children thinking like scientists. Have children change one variable and examine the cause-effect. (These would be a series of investigations over a period of days or weeks.) Join children in this science play, but let them take the lead. Encourage them to describe what they see, what they discover, and what they wonder, and to document their observations.
 - **Investigation 1:** Use the same ramp at the same incline, but vary the weight and size of the balls—some that are heavier or lighter, bigger or smaller. Pose a challenge: Which balls will knock down this block tower? Which will leave it standing?
 - **Investigation 2:** Use only one ball and the same ramp, but vary the steepness of the ramp. Have kids figure out how steep they need to make the ramp to knock down a particular block with a particular ball.
 - **Investigation 3:** Use the same ball and ramp and incline, but use different objects as obstacles. Have kids test and find out: What happens when this ball runs into...a toy car; a row of marbles; another ball; a sweater or stuffed animal; a paper towel tube with a ball balanced on top; etc.?



Reflect and Share



Encourage students to leave their favorite obstacle course set up for a class tour. At each obstacle course, invite students to talk about their creation and demonstrate with a ball. Encourage classmates to ask questions. Take photos of the obstacle courses or have children draw pictures of them. Have children dictate captions to the pictures.



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Online Video: Building Ramps

Kids build ramps with everyday objects and invent a bowling game.

Peep Video Connection

Watch and discuss **Kids Explore: Building Ramps** (1:30 minutes). The video clip is found in the Resources area of the *Peep* Web site (peepandthebigwideworld.org/resources). Go to the *Peep Explorer's Guide* section. You can watch the video in English or Spanish.

- *In this video, what are some of the things that the kids use to make ramps?*
- *What are some of the things we have used to make ramps?*
- *What games did the kids in the video invent using balls and ramps?*
- *What ideas did you get from the video for new ramp explorations you'd like to try?*

Classroom Close-Up

Micah and Olivia had a ramp with a plastic cup as their obstacle. They were rolling a water bottle down the ramp. Micah predicted, "It's not going to roll far." Olivia got frustrated as the bottle kept rolling off the ramp and never got near the cup. Through some inspiration, she went to the sink, filled the bottle with water and rolled it down the ramp again. This time it rolled in a much straighter path, hit the cup and knocked it over! "It hit the cup over because it's heavy," Olivia explained. Tomorrow I will ask Olivia to share her discovery with the group. Maybe I will learn more about what sparked her idea. It sure was a great one!

—Kira, preschool teacher



Photo: Jenn Sutton



Teacher Reflection

Explore Ramps

As teachers, we grow by reflecting on our classroom experiences and using those reflections to inform and improve our instruction. The following questions may help you reflect on the successes, surprises, and challenges of Unit 6: Explore Ramps. You may want to jot some notes in the spaces below.



- 1 What was the most satisfying part of the Explore Ramps unit for you and your students? Building long ramps? Sending objects down the playground slide? Something else? What made it so satisfying?



- 2 As you watched and listened to your children explore, what things surprised you? (For example, certain questions or observations about ramps and rolling, unusual ways children used the materials, special things that fascinated them.)



- 3 What activities might you change or extend the next time you use the Explore Ramps unit? What would you keep the same? How could you build on your children's particular interests and enthusiasm to make it an even richer science learning experience?



Classroom Close-Up

Kira reflects on one child's extended exploration of ramps, rolling balls, and obstacles.

After exploring “Steeper and Steeper” ramps with the group during Circle Time, I sent the kids off to continue building and exploring ramps of different steepness on their own. They had a great time building and exploring ramp structures—their focus, however, was not on comparing ramps of different heights and the distance a ball would travel, but on free exploration. It was clear they were having rich ideas and experiences, so I let go of my teaching agenda and focused on watching and listening to my young scientists and engineers at work.

One child, Vihaan, was sending a wiffle ball down a ramp that led to a tunnel built from chairs. He was experiencing some frustration, as the wiffle ball kept stopping as it hit the legs of the chair. This was a lovely set-up for the lesson I had planned for the next morning (obstacles), and it also set up a problem-solving challenge for Vihaan's own continued explorations.



Photo: Jem Sutton

The next day, students dived into the box of ramp materials and got to work. Vihaan created a project similar to the one he had built the day before. This time, his friend Ari joined him. They set a plastic cup as an obstacle in the chair tunnel. They wanted to make the wiffle ball hit the plastic cup and continue to roll to the end of the tunnel. However, when the wiffle ball hit the cup, it lost speed and the cup did not fall over.



Photo: Jem Sutton



Photo: Jem Sutton





Photo: Jem Sutton

Another problem that Vihaan and Ari encountered was that the ball had a tendency to go through the sides of the tunnel and roll away. They solved that problem by attaching cardboard to the sides of the tunnel.

Vihaan discovered that if he used a heavier ball, it would roll farther than the wiffle ball and it would knock down the plastic cup. Having conquered that challenge, he removed the cup and built a new obstacle, a piece of cardboard at the end of the tunnel, which he called the “winner’s end.” He wanted to “win” by sending the ball down the ramp and through the tunnel, hitting the “winner’s end” cardboard and making it fall down flat. He accomplished this and happily demonstrated his creation to the class. A great moment for me and for Vihaan.

I love to watch my students engrossed in their explorations. They often take the learning and experimentation in a direction I would never have thought of. When it feels appropriate, not disruptive, I ask them questions that show my genuine interest and respect for their ideas, like, “What were you thinking when you did this?” or “How did you know what to do?” The answers and the language they offer are often surprising and rich. As we share these discoveries and descriptions with the class, other kids pick up on various elements and pursue them in their own way...and the learning grows and multiplies.

—Kira, preschool teacher



Photo: Jem Sutton

