



# Experimenting With Inclines and Ramps

Standard Connection:  
 ELA.RL.PK4.1  
 ELA.RI.PK4.4  
 M.MD.PK4.1  
 M.MD.PK4.2a  
 PD.FM.PK4.5  
 S.PS.PK4.4  
 SS.OW.PK4.1

## Enduring Understanding(s):

- As individuals and as a group, family members use their senses to observe and interact with their environment.

## Essential Question(s):

- How do you find the resources, information, and support to solve your problems?

Materials	Vocabulary	Books
<ul style="list-style-type: none"> <li><i>The Seven Chinese Sisters</i></li> <li>marbles of different sizes</li> <li>other small balls (golf balls, bouncy balls, tennis balls etc.)</li> <li>container to hold the marbles</li> <li>blocks of different sizes to make ramps</li> <li>cardboard pieces</li> <li>foam or paper tubes cut in half the long way)</li> <li>clipboards</li> <li>paper</li> <li>writing utensils</li> </ul>	<ul style="list-style-type: none"> <li><b>construct:</b> make something</li> <li><b>incline:</b> a slanting surface</li> <li><b>ramp:</b> a sloping platform or other surface connecting two different levels</li> <li><b>experiment:</b> to explore by trying different things</li> <li><b>talent:</b> something a person can do very well</li> <li><b>steep:</b> almost straight up and down</li> </ul>	

Intro to Centers	
Preparation: Set up materials.	
"In <i>The Seven Chinese Sisters</i> , Fifth Sister's <b>talent</b> was catching any ball 'no matter how fast or high it was thrown'. What do you notice?"	<b>Show</b> illustration. <b>Children respond.</b>
"Fifth Sister probably knew a lot about how balls move."	
"Today in Blocks, you can <b>experiment</b> with how these (balls, marbles, etc.) move."	<b>Children respond.</b> <b>Model.</b>
"How can you use these _____ (blocks, tubes, etc.) to make the (balls, marbles, etc.) move?"	<b>Model</b> raising one end. <b>Children respond.</b>
"If you position the (blocks, tubes, etc.) this way, you <b>construct</b> an <b>incline</b> or a <b>ramp</b> ."	<b>Children respond.</b>
"What do you predict will happen if we <b>construct</b> a <b>steep incline</b> ?"	

## During Centers

Encourage children to experiment with different materials and different degrees of incline in order to observe how far/fast the marbles/balls are rolling. Invite children to record their ideas and questions. Encourage children to use what they know about stability- *Building Block Towers*- to construct ramps. Encourage children to create a plan before building. Encourage children to use mathematical language (angle, side, curve, etc.).

## Guiding Questions During Centers

- What affects the speed of the marbles/balls?
- What affects the distance- how far- the marbles/balls roll?
- How can you collaborate with a friend to create a ramp/incline?
- How is building a stable ramp similar to or different from building a stable block tower?

## Thinking and Feedback

- Invite children to share their processes. Encourage children to describe the challenges they might have encountered.

## Documentation

- Collect samples of the children's work, as well as photographs and/or video of their processes; use the documentation to launch a discussion during Thinking and Feedback.

## Provocation

Challenge children to make a plan to build the "Best Ramp Ever!". Encourage children to experiment with cause and effect: How could a rolling ball knock over dominoes? How could a ball roll through a tunnel and emerge at the other end, etc.

Children could collectively make a plan, build a prototype for a ramp, and then think about materials they might actually use to build a ramp that could stay up in the classroom.

Invite children to use Beautiful Stuff, including natural materials, to build ramps or to roll down the ramps.

Encourage children to use other materials (toy cars, other small toys) to experiment with speed and distance.

Encourage children to notice ramps around the school (wheelchair accessibility ramps, etc.). This could lead to conversations about how ramps are helpful.

## Differentiation/Accommodation

For Intro to Centers, children with limited verbal skills can use a pre-programmed voice output device to answer questions about the story. (Keep in mind these will likely be closed-ended questions, as those are easiest to program into devices.) This can also be used to help children answer Guiding Questions. During Centers, provide picture cards with vocabulary to remind children of mathematical language. Children can collaborate by having one child record ideas and questions for a small group of children. If the class includes a child in a wheelchair, this would be a great time to have a group of children or the class travel around the building and make observations about how the child in the wheelchair must navigate in different areas where there are ramps, or where there may be a step, but no ramp. Children can record their observations and questions for discussion.