

What Makes Things Move?

Big Idea: Science

The motion of objects depends on their properties.

Big Idea: Mathematics

Objects have attributes that can be described, measured, and compared.

Essential Questions:

How can you make objects move?

How does shape and size of an object affect the object's movements?

How does the material the object is made of affect the object's movements?

Assessment for Learning (Formative):

KWL chart ongoing.

Group discussions.

Observations and photo documentation.

Assessment of Learning (Summative):

Create your own ramp. (Plan test, revise, share where there is movement and describe the movement using science vocabulary, skills, and knowledge.

Resources:

Read Alouds:

How Toys Work Ramps and Wedges, Sian Smith Heinemann Library Chicago, Illinois. (2013) www.capstonepub.com

The Greedy Triangle, Greg Tang.

What do Wheels Do All Day? April Jones Prince, Giles Laroche. Scholastic. (2006).

Newton and Me, Lynne Mayer. (2014).

Professional Resources:

Ramps & Pathways A Constructivist Approach to Physics with Young Children. Rheta DeVries, Christina Sales.

Teaching STEM Literacy A Constructivist Approach for Ages 3 to 8, Juliana Texley, Ruth M. Ruud. Redleaf Press. (2018)

Science Kindergarten

Curricular Content:

- *Effects of pushes/pulls on movement (how things move: roll, slide, bounce...)*

Curricular Competencies:

- Observe objects and events in familiar contexts.
- Ask simple questions about familiar objects and events.
- Safely manipulate materials.
- Represent observations and ideas by drawing charts and simple pictographs.
- Transfer and apply learning to new situations.
- Share observations and ideas orally.

Mathematics Kindergarten

Curricular Content:

- single attributes of 2D shapes and 3D objects.

Curricular Competencies:

- Visualize to explore mathematical concepts.
- Use mathematical vocabulary and language to contribute to mathematical discussions.
- Connect mathematical concepts to each other and to other areas and personal interests.

Core Competencies:

Communication: *I can share my observations to the group. I can listen and think about other's observations. I can share ideas to build understanding as a group.*

Critical Thinking: *I can think about what I am trying. I can explore materials and actions. I can experiment with different ways of doing things.*

Personal Awareness: *I can show a sense of accomplishment and joy (through self-determination).*

Learning Intention	Instructional Activities	Resources
<p>I can share my ideas of how things move.</p>	<p style="text-align: center;">K of KWL chart & Mystery Bag of Items that Move</p> <p>Model: Show a variety of items moving or parts of them that move? (Eg. Toy truck, tape dispenser, spring, scissors, small hand garden shovel, toy fishing rod, cylindrical wood block...)</p> <p>Discuss: Think, pair, share students' ideas on how these items move. Allow for students to make connections to their experiences and knowledge of what makes things move?</p> <p>K KWL Chart: What do we know? Chart student responses on paper/ post its/ word, or audio record, to be reference throughout the inquiry.</p> <p>Assess & Plan: Use this section of the KWL chart as well as your observations from students' responses and discussions from when they observed the objects moving.</p>	<p>A variety of objects that will move in a mystery bag. See examples.</p> <p>Materials /technology to chart student responses.</p>

Learning Intention	Instructional Activities	Resources
<p>I can show a sense of wonder about the world.</p>	<p style="text-align: center;">Outdoor Lesson: Swings Experiment W of KWL chart</p> <p>Experiment: Have one student/teacher give one push to another student. The child on the swing will not pump their legs and the rest of the class will count how many swings it takes before the swing stops. Record data. Repeat and have the same student/teacher give one push to other children to make it a fair test. Record data.</p> <p>Analyze: Analyze data by creating two list: big swingers and little swingers. Which group swings more?</p> <p>Reflect: W of KWL Chart: In partners/ individually have students record (draw, label, write) their wonders on a post it note or type them up and add it to the W "I Wonder..." chart. This section of the chart can grow as the inquiry progresses.</p>	<p>Swings on the playground. Clipboard and paper to record data; use a t-chart with name of student and the number of swings.</p> <p>Materials /technology to chart student responses.</p>

Learning Intention	Instructional Activities	Resources
<p>I can make things move up and down a ramp. (bounce, roll, slide)</p> <p>I can explore pushes and pulls on ramps.</p>	<p style="text-align: center;">Making Things Move with Ramps L of KWL chart</p> <p>Story: Read aloud <i>Ramps and Wedges</i>, pgs. 1-13.</p> <p>Model: Model the basics of making a ramp. *A ramp connects a high place with a low place.</p> <p>Experiment: In groups/ partners, make and explore motion with ramps from different materials. Test and revise their theories.</p> <p>Extension: Ask students how to make their ramps fast, steep, or around a corner.</p> <p>Chart L of KWL: In partners/ individually have students record (draw, label, write) their learning on a post it notes or type them up and add it to the L "I learned..." chart. What is our new learning? How do things move on ramps? Where do we see ramps in real life? (E.g. slide, near doors/stairs, hills). Add any new wondering to the W of the KWL.</p>	<p>Book: How Toys Work Ramps and Wedges</p> <p>Materials to use as ramps. E.g. Cardboard lengths, wood blocks, long blocks, tubes, foam blocks. Marble run.</p>

Learning Intention	Instructional Activities	Resources
<p>I can describe 3D shapes.</p>	<p style="text-align: center;">Movement with 3D shapes</p> <p>Explore: Observe and compare as a group compare different attributes of 3D shapes. (Shape of face, edges, corners, height, length, width...)</p> <p>Demonstrate: Create a ramp with wood blocks/ cardboard/ shelf... Ensure that all students can easily observe each 3D shape as it moves down the ramp. Discuss the way that the shapes move. Roll, slide, turn, fast, slow, stop.</p> <p>Experiment: Allow student to then experiment with this activity at tables or on the carpet in partner or in groups. Use a 3D shapes from the math room: wood, plastic, hollow....</p> <p>Sort and Analyze: Sort the shapes into different groups. (Eg, shapes that slide, shapes that don't slide/ shapes that roll, shapes that don't roll, fast shapes, slow shapes.</p> <p>Photo: Take a few photos of groups experimenting. Photograph the different ways to sort the shapes by the ways they move.</p> <p>Chart L of KWL: Share out observations to add to the L "I learned..." chart. What is our new learning? How do things move on ramps? Where do we see ramps in real life? (E.g. slide, near doors/stairs, hills). Add any new wondering to the W of the KWL..</p> <p>Story: Read aloud, The Greedy Triangle as an extension. Make or share any connections to the story and our experiment.</p>	<p>A variety of 3D shapes wood or plastic.</p> <p>Materials to make a ramp.</p> <p>Two circles or hoops to sort shapes.</p> <p>Camera/ ipad</p>

Learning Intention	Instructional Activities	Resources
<p>I can describe 3D shapes.</p>	<p style="text-align: center;">Friction and Movement with 3D shapes</p> <p>Explore: Observe and compare as a group compare different attributes of 3D shapes. (Shape of face, edges, corners, height, length, width...)</p> <p>Demonstrate: Create a ramp with wood blocks/ cardboard/ she Ensure that all students can easily observe each 3D shape as it moves down the ramp. Discuss the way that the shapes move. Roll, slide, turn, fast, slow, stop. This time cover the ramp with different materials on each ramp. (Eg. Carpet, tiles, sandpaper, bubble wrap, think plastic film, rubber matting, foil, dirt, ice...).</p> <p>Experiment: Allow student to then experiment with friction in this activity at tables or on the carpet in partner or in groups. Use a 3D shapes from the math room: wood, plastic, hollow....</p> <p>Sort and Analyze: Sort the shapes into different groups. (Eg, textures that shapes slide on, textures that shapes that don't slide on/ textures that make the shape move fast, textures that make the shape move slowly (friction)).</p> <p>Chart L of KWL: Share out observations to add to the L "I learned..." chart. What is our new learning? How do things move on ramps? Where do we see ramps in real life? (E.g. slide, near doors/stairs, hills). Add any new wondering to the W of the KWL..</p> <p>Photo: Take a few photos of groups experimenting. Photograph the different ways to sort the shapes by the ways they move on the differing textures.</p>	<p>A variety of 3D shapes wood or plastic.</p> <p>Materials to make a ramp.</p> <p>Two circles or hoops to sort shapes.</p> <p>Camera/ ipad</p>

Learning Intention	Instructional Activities	Resources
<p>I can use my ideas about ramps to change how my marble rolls to make line art.</p>	<p style="text-align: center;">Marble Line Art</p> <p>Model: Have three small cups, each with a different colour of paint. Use a spoon to transfer the marble to the tray. Roll the marble over the paper that is laid in the tray, by creating a ramp by making a high side and a low side with the tray; like a hill. Experiment with the speed of the marble as the tray becomes more or less inclined. Discuss as a model the noticing of the path of the marble.</p> <p>Experiment: Students make and explore motion of the marbles as they make their line art.</p> <p>Extension: try going fast. try going slow. Can you go slow enough to control where the marble goes? Can you make a path on your paper with a marker to follow with the marble?</p>	<p>Cups, spoons, trays/ bins/ cardboard box lids, marbles, other rolling loose parts, paint.</p>

Learning Intention	Instructional Activities	Resources
<p>I can push a wedge into things.</p> <p>I can use my senses to explore.</p> <p>I can use tools safely.</p>	<p style="text-align: center;">Making Things Move with Wedges</p> <p>Story: Read aloud <i>Ramps and Wedges</i>, pgs. 14-21.</p> <p>Model: Model the basics of using a wedge. * A wedge has a sharp edge or point.</p> <p>Experiment: In groups/ partners explore different pushes with playdough, plasticine, or clay. Set up the following exploration tables as ways to explore wedges: 1) push in Mr. Potato Head pieces in playdough. 2) Push different textured rollers into playdough. 3) Cut playdough with scissors and a variety of clay shaping tools. 4) Nature items: shells, sticks, rocks, leaves, flowers.</p> <p>Chart L of KWL: In partners/ individually have students record (draw, label, write) their learning on a post it note or type them up and add it to the L "I learned..." chart. What is our new learning? How do things move on ramps? Where do we see wedges in real life? (E.g. scissors, butter knife, door stops.) Add any new wondering to the W of the KWL</p>	<p>Book: How Toys Work Ramps and Wedges</p> <p>Playdough/plasticine. Mr. Potato head. Scissors & clay tools. Stamps and rollers. Nature Items.</p>

Learning Intention	Instructional Activities	Resources
<p>I can show my observations and ideas by drawing simple pictures.</p> <p>I can add letters/ labels/ words to my drawing.</p> <p>Wheels make it easier to push or pull something.</p>	<p style="text-align: center;">Where do We Find wheels?</p> <p>Story: Read Aloud What do Wheels do All Day?</p> <p>Explore: Model how to move slowly and look closely in order to be able to closely search for wheels. Explore the classroom and school for wheels. Note: this could be done twice; once in the classroom, and then in the school the following day.</p> <p>Record with representations: Students draw wheels they find. Paper could be divided into 4 sections in order to find 4 different wheels or provide blank paper to allow for differentiation within the task. Look closely at the texture on the wheels. Are there different shapes or bumps? How does this affect the wheel? *Connect with previous lesson on friction.</p> <p>Discuss: Where are wheels found? How do wheels help us?</p> <p>Chart L of KWL: In partners/ individually have students record (draw, label, write) their learning on a post it note or type them up and add it to the L "I learned..." chart. Add or revise any new wondering to the W of the KWL.</p>	<p>Book: What do Wheels do All Day?</p>

Learning Intention	Instructional Activities	Resources
<p>I can apply what I know about what things move to make my own ramp.</p>	<p>Students will be able to deign their own ramp to demonstrate their understanding of how things move.</p> <p>Review: Together review the KWL chart. Compare what they used to know and how their learning had grown and changed. They will use this to design a ramp of their own. Provide a variety of tubes, card board, blocks etc. as before to aloe their to create.</p> <p>Plan: Can you make a ramp with a push and a pull? Can you make an object go faster and slower on your ramp? In groups or partners think of and draw their plan. Label items and pushes and any pulls.</p> <p>Develop: Students build and test their ramps. Make any additional plans or changes.</p> <p>Conference: Meet with partners/ small groups to conference about their ramps. Use this conference to plan for a short demonstration of their ramp to the class, do this while they are working so that you can support their ideas as they develop. Eg. "I wonder how you could stop it from jumping off the ramp? to go around the corner? to go up over the hill?"</p> <p>Present: Have students demonstrate their ramps to the class. They will describe how things are moving on their ramp using science motion vocabulary.</p>	<p>Build criteria together on what would make a good ramp.</p> <p>Camera/ ipad</p> <p>Paper and clipboard to make plans on.</p> <p>Building ramp materials and marbles, balls, ect. Textures for friction. Tape.</p>