Subject Integrative STEM: Ramp-n-Roll	**Grade Level** Preschool: age 5

Standards:

Science and Technology and Engineering Education PA Standards

- 3.2.PK.B1: Explore and describe motion of toys and objects.
- 3.2.PK.B7: Participate in simple investigations to answer a question or to test a prediction.

Math PA Standards

- 2.4.PK.A: Describe the process (es) (e.g., think aloud) related to problem solving situations.

Common Core Math Standards

- 2.4 PK.A.4 Classify objects and count the number of objects in each category.

PA Learning Standards for Early Childhood (constructing, organizing, and applying knowledge)

- AL.1 PK.A Explore and ask questions to seek meaningful information about a growing range of topics, ideas, and tasks.
- AL.1 PK.B Demonstrate a willingness to participate in new and challenging experiences.
- AL.2 PK.A Work toward completing a task, even if challenging, and despite interruptions.
- AL.2 PK.B Independently break simple tasks into steps and complete them one at a time.
- AL.2 PK.C Attempt to accomplish challenging tasks by employing familiar and new strategies as needed.
- AL.4 PK.C Attempt problem solving activities to achieve a positive outcome.

Reading, Writing, Speaking, and Listening PA Standards

- 1.4.PK.A: Write, dictate or illustrate to convey ideas for a specific purpose.
- 1.4 PK.B: With prompting and support, draw/ dictate about one specific topic.
- 1.4.PK.B: Write, dictate, or illustrate to communicate information.
- 1.6.PK.A: Listen attentively and respond in conversation.
- 1.6.PK.B: Speak in simple sentences. Share experiences when asked.

Objectives:

- With the teacher's help, the students will be able to create their own inclined plane with 100% accuracy.
- Students will be able to classify objects that can roll, slide, or not move down an inclined plane with 80% accuracy.
- Student's will be able to draw an example of an inclined plane in their 'Simple Machines' flipbook with 100% accuracy.
- Students will be able to explain their drawing to a partner with 100% accuracy.

Materials:

- Simple Machine flipbooks
    - markers
- Book- *Motion: Push and Pull, Fast and Slow* by Darlene Stille and Sheree Boyd
- poster board
    - examples of inclined planes
- cardboard
- blocks (to prop up ramp to various inclines)
- objects that may or may not roll: balls, plastic cups, plastic bottles, crayons, spools, rolls of tape, toy cars, socks (single or rolled pair), book, crumpled paper, small blocks, spoon
- paper to write: slide, roll, stay still
    - markers

Lesson Activator (Set Purpose):

- Read *Motion*, this book will start to get students thinking about how things move (great preview for the rest of the week)
- Ask students questions throughout the book
    - I did not have access to the book, so I cannot make specific questions about it
- We will make a quick classroom poster that has examples of inclined planes on it
- "Now that we have read this book, and have seen some examples of what types of objects move and what objects do not we are going to do some experiments."

Body of Lesson:

Ramp-n-Roll

- The students will be broken into groups, and each group will get different objects to try to roll down their inclined plane.
    - each group will get a piece of cardboard, 8 blocks, and 4 objects to roll
    - the teacher will demonstrate how the students will set up their ramp (4 blocks on each side and then place one end of the cardboard on the blocks) and then put their object at the top of the ramp and see if it slides or rolls down
        - <u>ask the students to:</u> predict what will happen when the object is placed at the top of the ramp?, will it slide?, will it roll?, will it stay put?, why do you think so?
- They will roll the objects down the inclined plane one at a time, they will communicate to each other if the object rolled down the plane or if it slide
- When the group is done with their objects they will rotate their objects to the next group (this will continue until they all use all objects)
- Once each group rolled each of the objects, we will come back together as a large group. We will talk about each of the items they rolled down and figure out if they moved, and if they moved did they roll or slide
    - after they are classified we will count how many objects are in each group
    - once all the items are classified, I will demonstrate some different ways that the objects can be placed on the ramp and ask the students to predict what will happen
        - a car placed sideways, a bottle standing up, roll of tape on its side, etc.

How Far and Fast?

- How far? How far do things go when they roll down the ramp? How can you make them roll farther?
- What happens when you raise or lower the ramp?
- How can you make an object roll down faster? How can you slow it down?
- Put something at the bottom of the ramp, race two objects down the ramp to see what gets there first.
- Can you find a way to part a toy car on the ramp without it rolling all the way down, or a way to make a rolling object stop halfway down the ramp?

Lesson Summarizer (Closure & Wrap-Around to Purpose):

- Gather the students back for whole class talk: "What we did today was work with inclined planes, and inclined planes are a simple machine. Inclined planes help things move down or up easier."
- "We got to see today how some objects roll down the inclined plane, some slide down the ramp, and others do not move. Then we made some modifications to see how we could make the objects roll farther or shorter and faster or slower."
- "We made this poster showing examples of inclined planes. We will hang the poster in the classroom as we work on more simple machines."
- "Now let's get out our 'Simple Machine' flip books and draw pictures of inclined planes.

Extra:

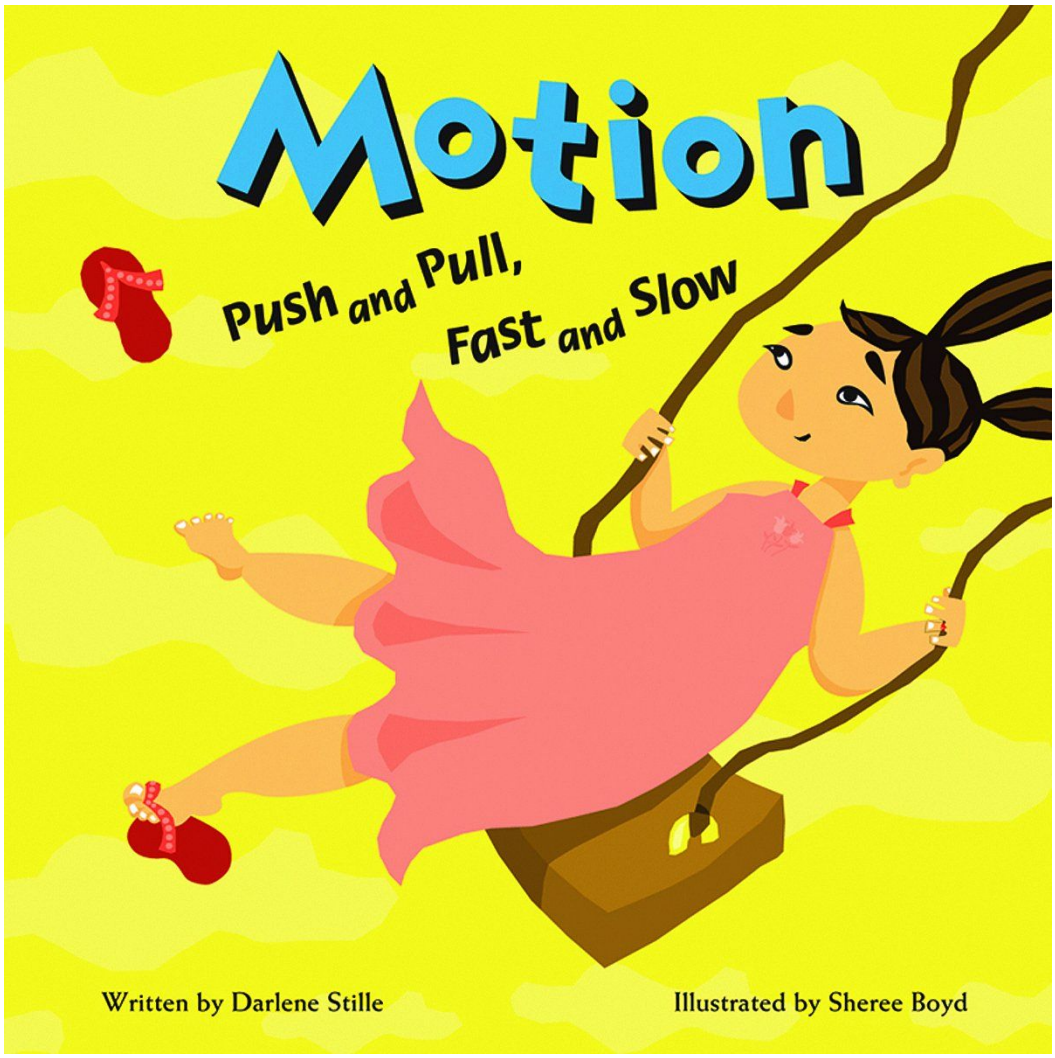
- If there is time, the students can go outside on the playground and explore to find inclined planes on the playground.

Formative or Summative Assessment of Student Learning:

- The students will draw pictures of inclined planes in their 'Simple Machine' flipbooks.
    - The teacher will observe the students drawings, and provide assistance and redirection when needed.
- They will do a pair and share at the carpet once they are done with their pictures.
    - The teacher will observe the students as they explain their pictures to their partner.
- The teacher will also observe the students throughout the lesson to provide assistance and redirection to the students. The teacher should also ask probing thoughtful questions about what the students are doing during the lesson.

References:

- http://www.pbs.org/parents/curiousgeorge/activities/pc_ramp_n_roll.html
- *Motion: Push and Pull, Fast and Slow* by Darlene Stille and Sheree Boyd


Motion
Push and Pull,
Fast and Slow
Written by Darlene Stille
Illustrated by Sheree Boyd