Science Mini Unit Lesson Plan

Unit Title: Barriers Up!

Unit Puzzling/Anchoring Phenomenon: Objects move differently on the playground

- **NGSS PEs**:
  K-PS2-1: Plan and conduct an investigation to determine the effect of different strengths of pushes or pulls on the motion of an object.
  K-PS2-2: Analyze data to determine how the direction of an object's motion can be changed by pushing or pulling.

Unit Driving Question: What causes objects to move the way they do on the playground?

Exemplar Explanation using the CER framing (that answers the unit driving question): Will be addressed in class 11/3

- **Claim:** Objects on the playground move the way they do because of the forces acting on them, such as pushes and pulls.
- **Evidence:**
  - A ball moves when it is touched.
  - When you push a ball, it moves in the direction you push it.
  - When you push a ball, it moves faster or slower based on how hard or soft you push it.
- **Reasoning:** Objects move the way they do on the playground by being pushed. The harder an object is pushed the faster/farther/longer it will go.

Learning Goal:

- Students will be able to show and explain how pushing ~~and pulling~~ causes an object to move.
- Students will be able to show and explain how the strength of a push ~~or pull~~ causes an object to move farther faster or slower and not as far.

Assessment (connected to learning goal) and possible rubric or checklist of must-haves: Update using "Gotta Haves"

Gotta Have Checklist:

- Arrows demonstrating that an object moves.
- Sequential order that object moves.
- Object moves fast/slow and shorter/farther based on the type of push.
- An object is moving.

Potential Student Ideas:

- I push a swing, and it moves.
- I go down the slide fast.
- I pull on the swing and it stops.
- Sometimes I kick my legs on the swing, and I keep going.

Lesson Modifications for specific students:

- Use stickers in the modeling
- Allow students to work in partners.
- Offer students the option to record audio of what they see/know rather than drawing models**.**

Source: Phenomenal Science
Phenomenal science K-5 curriculum. Phenomenal Science K-5 Curriculum. (n.d.). https://phenomscience.weebly.com/

LESSON ONE: ENGAGE

Lesson Question	**Phenomena**	**Instructional Sequence**	**Materials**
What causes objects to move the way they do on the playground?	Objects move differently on the playground	Engage: "Today we will watch a short video of our class playing on the playground. Let's watch closely for how each of you is making things move." Show video to the students.	Video of students playing on playground equipment (slide, swings).

		Ask students to turn and talk to share their ideas about what they saw/noticed. Ask students to talk about why things moved or how things moved and what things moved? Ask 2-3 students to share their ideas. (I will be listening for descriptive words such as fast/slow, push/pull, lean back/lean forward). After a few ideas have been shared, I will ask the following questions: ● How were people spinning?" ● " How were they moving the swings?" ● "Why do you think pumping their legs was moving them?"" * We will re-watch the video as needed *	
		Experience: I will ask the students to think about what they saw on the video and what they know happens when they go down a slide. I will then give the students a pre-drawn image of a slide slide image and before they begin to model, I will describe what a model is and we will talk about how they can add to their models. I will do this using the document camera. ● When you model you draw or write only what you see/know is happening. ● This model is of a slide. We will discuss the slide parts as a whole group. I will ask the student to help me identify the parts of the slide (I will highlight this on the image using a document camera and pointing out areas of the slide.) ● I will create a key to help the students with their own modeling. I will show them arrows and explain that these can be used to show movement. I will write the numbers 1,2, and 3 and say these can be written on or next to parts of the slide to show what happens 1st, 2nd, 3rd. ● I will explain to students they can include people and labels on their models if they think they need to. I will model using	- slide image (1 for each student) - crayons, markers, colored pencils (students each have a supply caddy)

		the document camera an example of labeling with guidance from the students.	
		Explain + Argue: We will have a class discussion about what we noticed and how we modeled that in our individual models. We would record the data using a whole class consensus model. Our class consensus model will be shown using a document camera and will match the slide image the students created their models on. The class consensus model will be the model we started as a class in the experience section. As a class we will add elements to the class consensus model. I will ask students to share their ideas and ask the whole class if they agree/disagree and when the whole class comes to an agreement we will add it to our model. **Driving Question** - The Driving Question will be listed above the K-L-E-W-S on the chart. I will introduce the question to the students before completing the K and W on the chart. **KLEWS Chart -** We will use a KLEWS chart to collect our thinking. I will explain the K (know) and the W (wonder) from the KLEWS chart. I will also let the students know that we will have this chart throughout our learning so we can/will add to it as we learn more about how things move on the playground. During our whole group discussion, we will use our class consensus models to recognize what we know and add this to the KLEWS chart under the K (Know). Then we will close the lesson with things the students wonder about. As students share their wonderings with the group, I will add them to the KLEWS chart under the W (Wondering). This will help support students with understanding Claim and Evidence as the learning continues.	- slide image - crayons, markers, colored pencils - chart paper for Driving Question and KLEWS chart

LESSON TWO: EXPERIENCE

Lesson Question	Phenomena	Instructional Sequence	Materials
What happens when we give a ball or an object a harder push?	A ball touched/ pushed/kicked harder will move farther/faster/ longer	Engage: The lesson will begin by having the students all sit on the carpet in a circle we will call it the "scientist circle". "Last time we saw a video of ourselves playing on the playground. We had some questions about why the swings go high, when you go down the slide it kind of moves, and how the "balance circles" move when you walk on them? Today we will explore some of our questions." I will introduce the investigation question by saying "we are going to see if we can answer some of our questions by investigating what happens when we give a ball a harder push." I will have this question written out on chart paper and show it to the students while reading the question out loud. I will then place a ball in front of me in the circle. I will ask the students, "How could we get this ball to move towards someone?" Students will be asked to do a turn and talk with a partner about their ideas of how to get the ball to move. I will then ask 2-3 students to share their ideas. (possible answers: push it, pull it, kick it, blow on it, use another object to move it). I will then ask the students, "which idea should we try?"	- Ball
		Experience: I will explain to the students that we are going to try their ideas. We will do the things the students suggested in the Engage portion.	- Data Sheet (1 per student) - Ball

		After we have tried all the ideas, I will say, “The ball moved! We were able to get the ball to move from me in all the ways you thought of. Is there a pattern that you noticed about how to get the ball to move?” Invite the students to turn and talk, then ask 2-3 students to share their ideas. (possible answers: pushes, something touched the ball, bumping it, hitting the ball, etc.) I will create a model of the students' ideas; this will be done in the whole group. The students will be encouraged to add this to their data sheets as well. * The students were getting the science circle set back up and while they were doing this I pushed the ball hard toward a student so it made it all the way to them and surprised them. I was then able to start a conversation by asking, “What just happened?” Invite 2-3 students to share ideas (possible answers) the ball will go farther; the ball will go faster). We also discussed what happened when the ball bounced. In the large group we discussed what patterns we noticed with the ball being pushed hard or soft. The students will have data collection sheets to create their models of what happens in the investigation. Data Sheet *I will create the first model in a whole group so the students can see how this can look. The students will create their own model for the ball that is touched /pushed harder.	
		Explain + Argue: The students will gather on the carpet. The KLEWS chart will be visible to all of them. I will say to the students, “Let’s think about what we did today. We started in a circle with a ball in front of me ~~in the center~~.” I will ask, “How did we get the ball to move? Was there a pattern we saw?” The student responses will be recorded in the E	- KLEWS chart - Markers

		(Evidence) column of the KLEWS chart (possible ideas: something had to touch the ball to get it to move). Next, I will ask, “What did we see happen when we pushed/touched/~~kicked~~ the ball harder?” I will ask 2-3 students to share their answers and record their thinking in the E column of the KLEWS chart. The students came up with “push the ball and it moves,” "Blowing on a ball moves it a little bit,” “kick a ball and it moves,” and “kick a ball hard and it goes far.” I will then ask the students, “How does what we investigated today help us understand our driving question of, “What causes objects to move the way they do on the playground?” I will write the students' ideas under the (L) Learning column of the KLEWS chart. I will ask the students, “Did anything we did today in our investigation make you wonder about anything new?” I will collect questions and ideas then add them to the W on the KLEWS chart.	

LESSON THREE: EXPLAIN + ARGUE

Lesson Question	**Phenomena**	**Instructional Sequence**	**Materials**
What causes objects to move the way they do on the playground?	Objects move differently on the playground	Engage: “Remember last time we were together we experimented with what happened when we touched/pushed the ball?” I will pause to let the students think and remember. I will ask, “What happened when we touched/pushed Allow students to share ideas. I will then say, “Then we wanted to see what happened if we touched/pushed the ball harder and we saw what happened with the ball.” Again, I will give students time to think. I will ask, “What happened then?” Allow students to share ideas.	- KLEWS chart - Markers - slide image (1 for each student) - student’s supply caddy

		I will then revisit the driving question. “What causes objects to move the way they do on the playground?” I will remind the students of what was added to the L on the KLEWS chart during the last lesson. The students added under “L”: “Pushing the spinner moved Stelly around,” “Pumping your legs moves the swing,” and “Pushing and pulling on monkey bars makes us move.”	
		Experience: I will give the students another copy of the slide image and ask them to think about the things they learned from the ball experience and use that knowledge to add or change anything about their original model. (They might add pushing with their hands makes them go faster down the slide, or if a friend pushes them, they will go faster down the slide). We will then have a whole group discussion and update our class consensus model with new ideas. (I was unable to do this because there was not enough time.)	
		Explain + Argue: I will remind the students of the unit driving question by saying “remember what we are trying to answer, what causes objects to move the way they do on the playground?” I will return to the KLEWS chart, and we will look at the wonderings that the students have had during this unit. I will read and review these with the students and we will discuss these as a whole group to see if they are able to answer any of these questions based on their new knowledge.	

		I will lead a class discussion by beginning with the driving question. “What causes objects to move the way they do on the playground?” I will remind the students to think about their models and I will read what is written on the KLEWS chart in the K (know) and E (evidence) columns to help guide them to understand that by touching/pushing a ball will move and by touching/pushing the ball will move faster/farther/longer. They can use the evidence from the ball experience to answer the driving question. By knowing that touch will make an object move and touching harder will make an object move faster/farther/longer the students can answer the driving question. Objects move the way they do on the playground by being touched/pushed. The harder an object is touched/pushed/~~kicked~~ the faster/farther/longer it will go. The students were able to answer the driving question by using their claims (what they know) and evidence. At the end of the learning the students decided that objects move on the playground by pushing it.	