

I. Title of Lesson: Forces: Push and Pull

Big Idea: Moving objects is an action we do without thinking about how it is done. The act of moving a chair back under the desk, or opening a door, are actions that take a specific type of force. How do we gain a deeper understanding of the movement and obstruction of movement concerning objects around us?

What must we do to open/close a door?

Can we move an object without touching it? Why not??

What are the two types of action that we can do to make an object move?

Why does a ball come back down when we throw it up?

Why does a toy car stop moving when we push it?

We will become scientists who will test and continue to test several methods in making certain objects move. Every groups will receive 2 – 3 objects in which they will be asked to look at/ “play with.” After analyzing their objects, they will be asked to move the object. This will require a push or pull of the object. After, the students will be asked to try to move the object without touching the object.

Finally, students will be asked to present a one-minute comment on what they learned from the activity done. One student will speak to represent the whole group.

Through this, students will be asked their thoughts on what they believe the topic of the current science unit will be. They will be introduced to the word Force and asked to discuss with their group on what they believe the definition of force may be, as determined by the activities that they partook in. Students will then, as a group, construct a ramp out of recyclable materials provided in the classroom, and talk about why the objects coming down the ramp move faster when compared to objects rolled up.

This lesson will be combined with several different disciplines:

- Science. The core component of this lesson is based on the expected standard for science in a Kindergarten class
- Literacy/Communication. The students will be given readers with the vocabulary words that will be used during this unit. Students will also be given many moments where they can individually (or as a group) share their thoughts on why certain things move/ stop moving.
- Technology. Microsoft Power Point will be used consistently as a visual to separate items that can be pulled or pushed (in a T-chart). The Power Point will also contain supplemental videos for students to watch to learn the vocabulary for the unit.

Commented [SFB1]: Investigate (I like to use this term with my four-year old grandson) Young children love using these terms in science☺

Commented [SFB2]: I suggest that you have them come up with a way to sort them –perhaps simply by giving them a two-column sheet that is wide enough to place each object on. This way they will engage in conversation explaining to one another why they think objects show the same “force.” You can then see if they come up with the terms “push” and “pull.”

- Art. The students will paint objects that they push/pull in every day circumstances
- Social Studies: Students will learn ~~about~~ about the concept of “work.” Whenever we act on an object of idea it is essentially work. You can address Isaac Newton broadly as well.

Commented [SFB3]: see this search on construction workers—good images.

As a Kindergarten, students are not expected to have a deeper understanding of force. This is an introductory unit. What the students are expected to understand by the end of the unit is that force is needed to move an object. Ways that we move objects are by pushing and pulling. Forces that act on objects that cause them to stop moving/ come back down are gravity and friction. Throughout time, forces have been an enigma to human society. Students will be asked to question why things stop/ continue to move.

II. Grade Level and Subject Area: Kindergarten Science, Social Studies, ELA, Art

III. Standards:

NGSS:

K.PS2-1

Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

K-PS2-2

Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull

CCSS: Art

K.4.2

Describe what is seen (including both literal and expressive content) in selected works of art

K.5.2

Look at and draw something used every day (e.g., scissors, toothbrush, fork) and describe how the object is used.

CCSS: Writing Standards

K.W.1

Use a combination of drawing, dictating and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.

K.W.8

With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

CCSS: Speaking and Listening Standards

K.SL.1

Participate in collaborative conversations with diverse partners about *kindergarten topics and texts* with peers and adults in small and larger groups

K.SL.3

Ask and answer questions in order to seek help, get information, or clarify something that is not understood

CCSS: Social Studies

K.6.3

Understand how people lived in earlier times and how their lives would be different today (e.g., getting water from a well, growing food, making clothing, having fun, forming organizations, living by rules and laws).

IV. Justification Statement: Why is understanding forces important?

- Pushing and Pulling | What is the difference? | Force and Energy for Kids (Video)
<https://www.youtube.com/watch?v=mEg5GOVpUIE&t=32s>
- Forces Can Push or Pull / Science Is A Snap | Jack Hartman (Video)
https://www.youtube.com/watch?v=E-SnC_WKsCg
- Push and Pull Poster
<https://i.pinimg.com/originals/4c/c7/6b/4cc76b3f50883480d45ca78950f42d3d.jpg>
<https://i.pinimg.com/originals/9c/bf/3d/9cbf3d1a967fa872160ffc481cad9067.jpg>
- Everyday objects for each group (e.g., pencil, eraser, cup, spoon/fork, chair)
- Optional: Smart Board for students to sort the objects that they can move with/ without touching (can also project on the ELMO and have manipulatives (visuals) to tape on the white board).

V. Measurable Objectives: At the conclusion of this lesson, students will be able to:

Commented [SFB4]: Also see:students will learn about jobs and how community helpers are important to our community. The CA Social Studies standard K.3 states, "Students match simple descriptions of work that people do and the names of related jobs at the school, in the local community, and from historical accounts."

A. ~~As students~~ play with the realia included during Day One, they will begin to build their own idea for forces, as well as the importance ~~in~~ of forces when it comes to society (such as ramps for moving heavy objects). Throughout the 6 days of working with forces, students will apply their knowledge from the previous days to build an efficient ramp that will roll down a ball the fastest.

B. ~~As students thinking drives the lesson, students will begin to~~ pursue their own inquiry: Why is learning about forces important (students' thinking drives the lesson)

At the conclusion of this lesson, teachers will:

~~D. Teacher will~~ utilize the stages of PBL to ensure that student thinking drives the integrated discipline learning.

1. Launch Project: Entry Event & Driving Question
2. Build Knowledge Understanding & Skill to answer Driving Question
3. Present Products that answer Driving Questions
4. Develop and Revise Products and answer Driving Questions

At the end of the unit it is expected that students will be interested in the daily functions that are made simpler thanks to the understanding of forces. Students will be able to understand and differentiate both pushing and pulling as methods of moving an object. Students will also be able to understand friction and gravity.

Teams will present their understanding of forces by presenting their ramps and explaining their engineering justifications when concerning gravity.

VI. Total Time: The Unit of Forces is 6 lessons long (one lesson a day) the first three lessons are a total of 30 minutes each while the last 3 lessons are 45 minutes long.

VII. Social Skills and or Habits of Mind to Engage/Assess

<input type="checkbox"/> Sit eyeball to eyeball	<input type="checkbox"/> Persistence
<input type="checkbox"/> Use each other's names	<input type="checkbox"/> Empathetic Listening
<input type="checkbox"/> Share materials	<input type="checkbox"/> Questioning
<input type="checkbox"/> Encourage each other	<input type="checkbox"/> Problem posing
<input type="checkbox"/> Disagree with the idea – not the person	<input type="checkbox"/> Drawing on Past Knowledge
<input type="checkbox"/> Use 6" voices	<input type="checkbox"/> Inquisitiveness, curiosity
<input type="checkbox"/> Respect the opinions of others	<input type="checkbox"/> Enjoyment of Problem Solving
<input type="checkbox"/> Think for yourself	
<input type="checkbox"/> Reach consensus	

Commented [SFB5]: See the community helpers pics in this link:
https://images.search.yahoo.com/search/images;_ylt=Awr9ImwzWL9c7z4A8TVXNvoA;_ylt=X3oDMTEzZ2M5aGc1BGNvbG8DZ3ExBHBvcwMxBHZ0aWQDREZENl8xBHNIYwNwaXZz?p=teaching+children+about+construction+workers&fr2=piv-web&fr=mcafee

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VIII. Level of Voice Appropriate for Activity:

Noise Level Chart



- The Noise Level during group work will be at a 2 – 3. When presenting the ramps, students will speak at a 4.

IX. 5E Framework: (Student Behavior)

Engage : Direct Instruction on how we are going to learn about forces by creating a ramp that can roll a ball down the fastest. Perhaps a demonstration?

Paper Monitor: Make sure your team passes the materials to the group when the teacher hands them the materials. Also makes sure that class materials (such as scissors, tape, pencil, glue) is placed back in its spot when finished using.

Walker: This student will walk around to other groups to reference-get ideas to help support their teams' construction of a ramp that makes work easier-

Speaker: Will speak for the group when asked general questions

Encourager: Will encourage positivity and make sure students are respecting each other's opinions.

Explore: Students will build their ramp as a group, while utilizing the recyclable materials to the best of their ability. Students must stay in their roles, but all students may collaborate during the construction of the ramp.

Formation of Groups: 5 groups of 4 students (dependent on class size)

Explain/Extend: As students are beginning to complete their construction of the ramp, they will be asked to prepare their one-minute presentation in which they will answer two questions: Why did you build the ramp like this? How do you think forces help the ball going down your ramp?

After watching multiple ramps working (as we observe that the steeper ramp helps objects come down faster), groups will be asked the question, again, “How do you think forces help the ball going down the ramp”?

Evaluate:

Content Formative Assessment is seen below:

There will be several formative assessments that will be applied throughout the unit to view ongoing understanding/ misconceptions by the students. Students will be assessed on their understanding of push and pull as well as the efficiency of their ramp.

Formative assessment of non-cognitive factors is seen below:

Students will also be assessed for effort and contribution to the construction of the ramp whether it be with creating it or giving their ideas. This will all be assessed in the form of a checklist with added notes.

Content Summative Assessment is seen below:

Criteria of Ramp:

- 1. Does the ramp seem to consider gravity?*
- 2. Are the students using vocabulary when describing their ramp?*
- 3. Does the construction show evidence that all team members were involved?*

Commented [SFB6]: It may be a good idea to have them predict and perhaps draw what they want their ramp to look like at the outset.

Commented [SFB7]: While too early for K do keep in mind that you are helping them to engage in the NGSS processes of observing phenomena, making claims, and providing evidence

Commented [SFB8]: You need to include these☺

Materials List:

- Pencils
- Scissors
- Glue
- Tape
- Paper Towel Holder
- Empty Cartons
- Paper Plates
- Ping Pong Ball
- Thick Poster Board

Bibliography (Stories read during story time during these two weeks)

- [Motion: Push and Pull, Fast and Slow](#)
- [Magnets Push, Magnets Pull](#)
- [Move It! Motion, Forces and You](#)