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| **Subject:** Science | **Unit Title:** Sequencing *through* Pushes and Pulls using STEMscopes | **Dates of Instruction: J**anuary 2019 |
| **Unit Overview:** This unit is about forces and motion. It will help students to understand the world around them and how things work. Students will explore forces, or pushes and pulls, and how they can change the way something moves. They will also learn about position, and how motion is a change of position. What are some things they can push or pull to move? Speed tells how fast something moves. Fast objects can go farther distances in a small amount of time. They will learn that they need more force to move heavier objects, Friction force acts in the opposite direction of motion to slow down moving things. That is why an icy road is slippery and it is harder to skate on grass than on concrete. Students are used to moving objects. They throw balls, play with toy cars, and sweep the floor, but how much do they think about these actions?Classes in Middle School, High School, and CBLP will investigate the topic of Pushes and Pulls as part of the STEMScopes program.  |
| **Standards:****MS-PS2-2:** Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.**HS-PS2-3:** Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. |
| **Vocabulary:** Push, pull, motion, force, friction, speed, fast, slow, position, weight, heavy and speed. |
| **H.O.T.Q:** |
| *1- Remembering*Locate(find/touch) what we learned about today.What is the definition of pushing/pulling?What is friction?How do objects move and change position? (pushes and pulls)What force did I use when opening/closing the door?  | *2 – Understanding*How could you classify pulling vs. Pushing?Use your own words to summarize the lesson.Describe what happens when you push/pull an item?Give another example of a time when you pushed/ pulled something.Describe other forces that cause a push and a pull. | *3 – Applying*Explain another situation where you had to push/pull an item and it didn’t work.Explain your investigation results. |
| *4 – Analyzing*What conclusions can you draw at the end of the unit?Distinguish between friction and speed. What is the relationship between force and motion?What might happen if I apply force to move an item? | *5 – Evaluating*Do you agree that force is important piece of information in this lesson?Do you agree with the outcome? Why?What are the consequences of force on an item? | *6 – Creating*Design a tool that can help in this lesson. |
| **Learning Targets – I can...** | **Suggested Instructional Activities:** | **Suggested Assessments:** |
| 1. Define unit vocabulary.
2. Examine prior knowledge of forces and motion
3. Tell facts about motion.
4. Identify the different forces.
5. Identify pushing.
6. Identify pulling.
7. Define what something in motion looks like.
8. Identify when an object is still or in motion.
9. Make connections between pushes and pulls.
10. Identify the effect of forces on an object.
11. Demonstrate a push or a pull on objects in their environment.
12. Describe other forces that cause a push and a pull.
13. Compare the effects of different strengths.
14. Compare the different directions of pushes and pulls on the motion of an object.
15. Describe the relationship between energy and forces.
16. Analyze information about forces of matter.
17. Explain that force makes an object move or change direction by pushing or pulling something.
18. Conduct a simple investigation about pushing and pulling.
19. Record and compare measurement data during an investigation.
20. Analyze data about the investigation.
21. Explain investigation results.
 | * Put together a list of items that require a push, pull, or both to operate or use. Send small groups on a scavenger hunt around the classroom to find items.
* Students can sketch items and describe its position or location in the school, or take digital pictures of the item, if possible, and describe each item’s position to the class.
* Explain that a force is a push or pull that can change an object’s position and put it in motion. Brainstorm different ways children push and pull things to move them.
* Create a t-chart, write down objects that can be pushed or pulled (objects at home, in the classroom, on the playground).
* Students can experiment with pushing a ball hard and with less force to knock over items. They can compare a big push to a small push. What kind of push made the ball move the fastest? They will see how when objects collide.
 | * The teacher calls on a student to demonstrate the "push" force by opening the door. After the last student walks out of the classroom, the teacher calls on a student to demonstrate the "push" force by closing the door.
* The teacher has the students use the K/W/L (What I Know, What I Want to Know, What I Learned) chart and has the students share what they learned about pushing and pulling an object.
* The teacher records students’ answers on the chart under the L column (What I Learned). The teacher asks the students if they learned what they wanted to know about pushing and pulling an object. The teacher refers to the chart under the W column (What I Want to Know).
* The teacher puts the students into cooperative learning groups. The teacher supplies the following materials to each group: miniature marshmallows, rubber band, plastic spoon, wooden block, wooden ruler, masking tape and yarn.
* The teacher instructs each group to construct a catapult and explains that they are going to investigate "pushing" a marshmallow.
* The teacher instructs the students to take out their science notebooks and draw their catapult.
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| **SANDI/Focus Skill: Sequencing** |
| *Level One:*Looks at or turns toward a familiar person (Re. 1)Visually follows a familiar person for 5 seconds (Re. 7)Visually follows object for 5 seconds (Re. 8)Shows interest in an object for 1 min (Re. 10)Connects objects with familiar events (Re. 14)Responds to environmental cues (Re. 15)Connects spoken words with familiar events (Re. 16)Turns pages of a book one at a time (Re. 24)Completes an ABAB puzzle (Re. 28)Holds and explores an object (Wr. 3)Picks up small objects (Wr. 6)Uses hand/eye coordination to place items in a container (Wr. 10)Follows left to right sequence when writing (Wr. 13)Recognizes and reacts to familiar sounds (CD. 7)Responds to simple requests (CD. 16)Follows 5 one-step directions (SE. 27)Gives items to people in a group (Ma. 10)Makes sets of items (Ma. 11)Orders items according to characteristic (Ma. 13)Writes numbers in proper sequence (Ma. 21) | *Level Two:*Matches symbols/pictures to activities (Re. 29)Follows a daily schedule (Re. 30, 78)Re-tells a story (Re. 36)Recites the alphabet (Re. 48. 49)Names letters (Re. 50, 51)Follows instructions to perform actions (Re. 66)Completes/Extends an ABC puzzle (Wr. 28)Sequences picture cards left to right (Wr. 36)Writes/dictates events about things that happened (Wr. 38, 45-47)Performs actions to comply with directions (CD. 38)Takes turns during structured group activity (SE. 35)Completes a set of activities independently using visual cues (SE. 43)Shows 1:1 correspondence using 5 identical sets of real objects (TE.4)Completes a multi-step classroom job (TE. 6)Follows picture/word schedule to complete tasks in a work system (TE. 8)Follows safety rules (TC. 18)Identifies today, yesterday, and tomorrow (Ma. 71) | *Level Three:*Describes sequence of a text (Re. 79)Sequences pictures to show events of a story including beginning, middle, endAssembles a model with directions (Re. 87)Writes based off story starter (Wr. 48)Writes an opinion piece (Wr. 57)Writes 3 paragraph letter (Wr. 60)Performs actions to comply with directions (CD. 56)Participates in conversations with peers (CD. 57)Recounts events to a peer (CD. 65)Uses if/then to support an argument (CD. 68)Gives multi-step directions to get around location (CD. 75)Gives sequential steps for a task (CD. 80)Identifies personal goal with steps/describes progress made toward a personal goal (SE. 73, 74)Completes a multi-step assembly/packaging routine (TE. 15)Identifies start times of events (Ma. 84)Extends ABAB pattern using symbols (Ma. 86) |