Science K-2: I Like to Move It, Move It

Intended Audience: Students with significant cognitive disabilities

# **Standards:**

 SC.K.P.12.1 Investigate that things move in different ways, such as fast, slow, etc.

SC.K.P.13.1 Observe that a push or a pull can change the way that an object is moving.

SC.K.N.1.5 Recognize that learning can come from careful observation.

SC.1.P.12.1 Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.

SC.1.P.13.1 Demonstrate that the way to change the motion of an object is by applying a push or a pull.

SC.1.N.1.3 Keep records as appropriate- such as pictorial and written records- of investigations conducted.

SC.2.P.13.1 Investigate the effect of applying various pushes and pulls on different objects.

SC.2.P.13.4 Demonstrate that the greater the force (push or pull) applied to an object, the greater the change in the motion of the object.

SC.2.N.1.4 Explain how particular science investigations should yield similar conclusions when repeated.

# **Learning Objectives:**

1. Students will demonstrate that pushing and pulling can change the direction of a moving object.

2. Students will describe the different ways that familiar objects can move.

3. Students will demonstrate that different forces can change the speed at which familiar objects move.

# **Vocabulary:**

1. force: strength or energy exerted

2. push: to use force to move something forward or away from you

3. pull: to hold onto and move something toward you

**Materials:**

* Gather prior to instruction: familiar objects that may be moved in various ways (i.e. a ball/sphere, objects with wheels, other three-dimensional objects)
* Create prior to instruction: a chart or graphic organizer to collect data (for small group and independent work)
* Science Journals
* A ramp or sloped area and a flat surface (i.e. floor, large rectangular table)
* Video: Science Adventures for Kids: [Push and Pull](https://www.youtube.com/watch?v=dj27RwnUopQ)

# **Essential/Guiding Questions:**

 1. How does the direction of force (push or pull) affect the way an object moves?

 2. How does the degree of force affect the way an object moves?

 3. How does the shape of an object affect the way it moves?

# Lesson Presentation:

**Activating Prior Knowledge:**

1. Tell students that they are going to explore the way that familiar objects move. Show them a ball, small car or truck. Ask students to stop and jot on a sticky note (or turn and talk to a partner) ways in which they think the object might move or be moved.

2. Have students share out ideas; jot ideas on chart paper.

3. Show them the video: Science Adventures for Kids: [Push and Pull](https://www.youtube.com/watch?v=dj27RwnUopQ)

**Modeled instruction:**

1. Show them a ball, a pencil or an object with wheels. Tell students that each of these objects moves with force. Define force and model what force might look like.

2. Tell students that objects can move when they are pushed or pulled in different directions. Define push and pull; model what each movement looks like and give a visual/picture example.

3. With various familiar objects, push and pull them with both hard and soft force.

4. Engage students with [Pushes and Pulls Virtual Manipulative](http://www.bbc.co.uk/schools/scienceclips/ages/5_6/pushes_pulls_fs.shtml). Students virtually push and pull objects on the screen with hard and soft force.

5. Ask students: What makes the objects move? (force) What moves an object toward you? (pull) What moves an object away from you? (push)

**Supported/Guided instruction:**

1. Review pushing and pulling with hard and soft force with [Pushes and Pulls Virtual Manipulative](http://www.bbc.co.uk/schools/scienceclips/ages/5_6/pushes_pulls_fs.shtml). Review vocabulary: push, pull, force.

2. Show “push and pull” photos. Ask students “What do you see happening in these photos?”

3. Revisit the objects that were used in modeled instruction. Have students move objects on a flat surface. Students jot their observations in Science journals or on a graphic organizer.

4. Pose the question, “I wonder what would happen if objects were moved on an angled surface (ramp)? Accept various answers. Students jot predictions/wonders in Science journal or graphic organizer.

5. In small or whole group, give students an opportunity to explore moving objects on flat and angled surfaces. Support with assistance in moving larger objects (if necessary) and jotting observations in journals or on graphic organizer.

**Independent Work:**

1. Students can work independently and in small groups at demonstration stations. A suggestion is to have 4 stations: one for pushing on a flat surface, one of pushing on an angled surface, one for pulling on a flat surface, and one for pulling on an angled surface.

2. Students will demonstrate and explain how a variety of different objects move on a flat surface and on an angled surface (ramp).

3. At each station, students could also write about their observations and experiences in a science journal.

**Small group suggestions:**

1. Students can sort photos into 2 categories: those that show push and those that show pull.

2. Students can find opportunities within the classroom where there are pushes and pulls.

3. Students can read an article about force and motion (various options listed below in Additional Resources) and show/share what they know.

4. Students can demonstrate and describe how objects can move in other ways (i.e. circular, zigzag, back and forth).

# Assessment:

1. Students will demonstrate and explain how the direction and degree of force affect how an object moves.

2. Teachers should utilize district created rubrics to score student work.

# UDL:

**Multiple means of representation:**

1. Students can use a graphic organizer to organize which objects moved faster or slower or which objects moved more easily when pushed or pulled.

2. Students can write their ideas and discoveries in Science journals.

3. Students can orally share their observations and discoveries.

4. Students can draw pictures to describe and express their observations.

5. Students can use photos to categorize their observations.

6. Students can work individually, in pairs, or in a small group.

7. Students can work independently with peer or adult supports.

**Multiple means of expression:**

1. Expression may come in the form of verbal responses, signed responses, pointing/gestures, eye gaze, or through the use of a low or high tech device.

2. All students should have access to expressive language/technology that is appropriate for their specific need.

3. Students can use an iPad or other touch device to show similarities and differences.

4. Text to speech options are available for computers, iPads and other hand held devices. Google Chrome offers free extensions, such as Selection Reader and Select and Speak-Text to Speech, and apps, such as Text to Speech, Text to Speech with Google Drive, and TTS Reader- Unlimited Text-to-Speech.

5. Speech to text options are also available from Google. Extensions include Voice Note II-Speech to Text, Online speech recognition, and Co: Writer Universal. Voice Note II is also available as an app; Speech notes-Speech to Text Notepad is available as well.

6. Additional information about text to speech and speech to text options are available through your district Assistive Technology Department.

**Multiple means of engagement:**

1. Provide students with choices of how to interact with materials. Objects may be actually objects or virtual manipulatives.

2. Provide students or small groups with various places in the classroom in which to work, i.e. floor, desks, at the board.

3. Limit distractions in the work areas.

4. Encourage collaboration with peers in partners or small groups.

5. Allow students to work independently.

6. Allow students to be positioned for maximum learning engagement.

7. Provide students with additional materials, if necessary.

8. Provide supervision to students who need assistance when handling hard, and potentially dangerous, objects.

# Assistive Technology Recommendations:

1. All students should have a means of expressive communication and a way to be actively engaged in learning.

2. Response modes may include, but are not limited to: eye gaze, gesturing or pointing to pictures/words/phrases, signing, low tech devices (GoTalks, etc.), or dynamic devices (iPad, etc.)

3. Lesson vocabulary, photos/pictures and graphic representations should be created and/or printed prior to the lesson to provide all students with an opportunity to be engaged in discussion.

# Technology Needed:

* Smartboard

# Additional Resources:

* From floridastudents.org, Grade K: [Pushes and Pulls Virtual Manipulative](http://www.bbc.co.uk/schools/scienceclips/ages/5_6/pushes_pulls_fs.shtml)
* From floridastudents.org, Grade K: [Force and Movement Virtual Manipulative](http://www.bbc.co.uk/schools/scienceclips/ages/6_7/forces_movement_fs.shtml)
* From floridastudents.org, Grade 1: [Playing With Science: Push and Pull](http://www.floridastudents.org/PreviewResource/StudentResource/173544)
* Book: Motion: Push and Pull, Fast and Slow, by Darlene Stille, Sheree Boyd, illus.
* Book: Move it! Motion, Forces, and You by Adrienne Mason, Claudia Davila, illus.
* Video Clip: [Bill Nye the Science Guy: Force and Motion](https://www.youtube.com/watch?v=8iKhLGK7HGk)
* Video Clip: [What is a Force?](https://www.youtube.com/watch?v=uoKo3DbfYZk)
* Readworks article: [Will You Push or Pull?](https://www.readworks.org/article/Will-You-Push-or-Pull/cfb9c500-233c-4bc6-8d5e-f9ee703614e3#!articleTab:content/)
* Readworks article: [Who Can Pull Harder?](https://www.readworks.org/article/Who-Can-Pull-Harder/3e28eb7b-1881-413e-94ec-e47e4d7a6a5d#!articleTab:content/)
* Readworks article: [A Big Push](https://www.readworks.org/article/A-Big-Push/66caac75-bde6-40f9-87ed-77a4e0366422#!articleTab:content/)
* O-W-L chart in lieu of a graphic organizer

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