

Investigating Patterns of Movement



Focus: Students investigate patterns of movement and discover how the forces of push and pull are necessary to initiate movement.

Specific Curriculum Outcomes

Students will be expected to:

- 38.0 investigate different patterns of movement [GCO 1/3]
- 6.0 predict based on an observed pattern [GCO 2]
- 2.0 communicate using scientific terminology [GCO 2]

Performance Indicators

Students who achieve these outcomes will be able to:

- investigate, describe, and represent different patterns of movement
- identify pushes and pulls necessary to initiate movement

NOTES:

Attitude Outcome Statements

Encourage students to:

- work with others in exploring and investigating [GCO 4]
- be open-minded in their explorations [GCO 4]

Cross-Curricular Connections

English Language Arts

Students will be expected to:

- interact with sensitivity and respect, considering the situation, audience, and purpose [GCO 3]
- use writing and other forms of representation to explore, clarify, and reflect on their thoughts, feelings, experiences, and learnings; and to use their imaginations [GCO 8]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Science Card 1 (optional) • Science Card 2 (optional) • BLM <i>Sorting Chart</i> • Science Card 7 • IWB Activity 6 • Science Card 8 • Science Card 3 (optional) Literacy Place: • <i>Come to the Pow-wow!</i> (Shared Reading – Synthesizing Strategy Unit)	• students' Science Folders • pull toy • variety of objects from the Curiosity Centre • measuring tools • magnifying lenses • recording materials • students' Science Journals • 2 large dice • digital camera or tablet • old magazines	• Create movement dice by labelling one die with different movements and the second with ways to move (e.g., fast, slow, forward, backward, etc.). • Invite an Elder or an Indigenous Knowledge Keeper to introduce students to traditional Indigenous games involving movement.	• pattern • force • push • pull

Science Background

- In science, the word “force” has a precise meaning. For students at this age, it is appropriate to describe a force as a push or a pull.
- A force is not something that an object contains or ‘has in it.’ A force is exerted on one object by another object.
- Both living and non-living things can exert a force as well as have a force exerted on them.
- Humans and other animals have muscles that produce force allowing them to move. In objects, force is produced by some outside source.
- The way to start an object moving or change how it is moving is to give it a push or a pull.

Possible Misconceptions

- The word “force” has meanings in the everyday lives of students (e.g., forcing someone to do something; the police force; “May the force be with you.”). Reinforce with students that in science, a force is a push or a pull.

- Young students tend to associate pushes and pulls with living things and to a lesser extent with machines that cause motion, such a bulldozer pushing a pile of rocks.
- Many students believe that something that can't be observed or felt by humans (or animals) doesn't exist. It is important to explain that while forces cannot be seen, their effects can.

ACTIVATE



Literacy Place Connection:

Revisit or read *Come to the Pow-wow!* by Wendy A. Lewis. Ask:

- **What patterns are described in the story?** (patterns of beads)

Then ask:

- **What other patterns are described?** (patterns of movement)

Discuss with students how Raven twirls and spins as she dances and then how both girls stomped and twirled. Reinforce that these are patterns of movement.

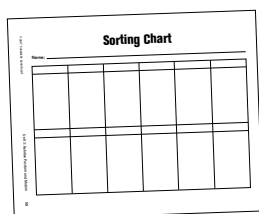


Sorting Objects and Animals

Display Science Cards 1 and 2 and review with students the non-living and living things that move and how they move. Challenge students to sort the objects and/or people and other animals according to how they move. Create a class sorting chart to record the information. Explain that a way of moving is called a pattern of movement. Ask:

- **Do any living and non-living things move in the same way?** (e.g., dice roll and horses roll on the ground.)

rotate: yo-yo top hula hoop girl	swing: swings	bounce: dice bouncy ball with handles ball	slide: hockey puck sleds	roll: in-line skates dice ball horse	fly: paper airplane butterfly
climb: bears	jump/hop: whale kids cat dog boy with crutches	crawl: snail	swim: girl whale	shake: dog	



Have students record the information on their own copy of BLM *Sorting Chart* and then challenge them to add more objects or animals for each category identified. Invite students to share with a partner which objects or animals they added to their charts. Remind students to store their completed BLMs in their Science Folders.

Pushes and Pulls

Place a toy, such as a pull toy, in front of the class and ask:

- **How can we make this object move?**



Try out students' suggestions. Ask them to describe what they are doing to make the object move. Conclude with the students that an object needs a "push" or a "pull" to move. Tell students that a push or pull is called a "force." Add all three terms to the Word Wall. Invite students to add any questions they may have about pushes and pulls to the I Wonder Wall.

CONNECT



How Will It Move?

Display Science Card 7 and have students examine the photos. Ask them to predict how each object may move. Have similar objects, as well as a variety of other objects, in the classroom Curiosity Centre for investigation following the discussion (e.g., wheeled toys, pull toys, spinning tops or yo-yos, pendulums, rubber balls, hockey pucks, marbles, salad spinner, corkscrew, hand mixer, etc.).

In pairs or small groups, have students choose several objects from the Curiosity Centre, make a prediction of how each will move, and investigate how they move. Provide tools for measuring, magnifying lenses, and recording materials. Encourage students to move the objects in unconventional ways. Ask:

- Did the object move in the way you predicted?
- Did the object need a push or a pull?
- How did the objects move similarly or differently from each other?
- How do pushes and pulls make objects move in different ways?



In their Science Journals, students can describe and draw diagrams showing how their objects moved. Ask:

- What else would you like to find out about how or why objects move?



Students can record their questions on the I Wonder Wall.

Movement Dice

Provide 2 large movement dice (one labelled with different movements and the second with ways to move, e.g., fast, slow, forward, backward, 3 times, etc.). Have students take turns rolling both dice and making the movements. Ask students to decide whether each movement is caused by pushing or pulling (e.g., when we walk, our feet are pushing us forward).

Imitating Animal Movements

Invite students to imitate the ways in which animals move and identify where the push or pull occurs that assists the animals in moving (e.g., a bird's wings pushing against the air). Students can take digital photos of their classmates imitating an animal then write a sentence describing the movement (e.g., Vicky slithers like a snake.). Students could then take their photos and sentence and put them in a PicCollage.

IWB Activity:

- Students can use Activity 6: *Push or pull?* (see the Teacher's Website) to identify whether a 'push' or a 'pull' is needed to move each object shown.



CONSOLIDATE

Push and Pull on the Playground

Students can investigate the forces of push and pull using various equipment in the playground, e.g., monkey bars, see-saw, swings, slide, merry-go-round. As they investigate, have students create a video of the playground forces. Ask:

- How is the motion different or the same on each piece of equipment?
- When do you pull? When do you push?
- How do pushes and pulls affect movement?

Display Science Card 8 and have students identify the forces shown for the various pieces of playground equipment on the card. Ask:

- Which image shows a push? A pull?

Have students use sticky notes to label each force shown on the card. Students can record in their Science Journals their understanding of how pushes and pulls affect the motion of objects.

Traditional Games

Invite an Elder or an Indigenous Knowledge Keeper to visit and introduce traditional Indigenous games to the students. Students can discuss the various movements involved in playing the games.

EXPLORE MORE

Identifying Forces

Students can cut out pictures from old magazines or print some pictures from the Internet showing forces being used to move objects. Have students label each force as a push or a pull. Alternatively, students can use sticky notes to label the forces shown at the construction site on Science Card 3.

Scavenger Hunt

Students can go on a push and pull scavenger hunt in the classroom or around the school noting in their Science Journals objects that require a push or a pull to move. Students might also take digital images or make a video of the objects in motion. Invite students to tell how our lives would be different if we didn't push or pull these things (e.g., pulling on the door handle lets us open the door and leave the room).

Sorting Chart

Name: _____
