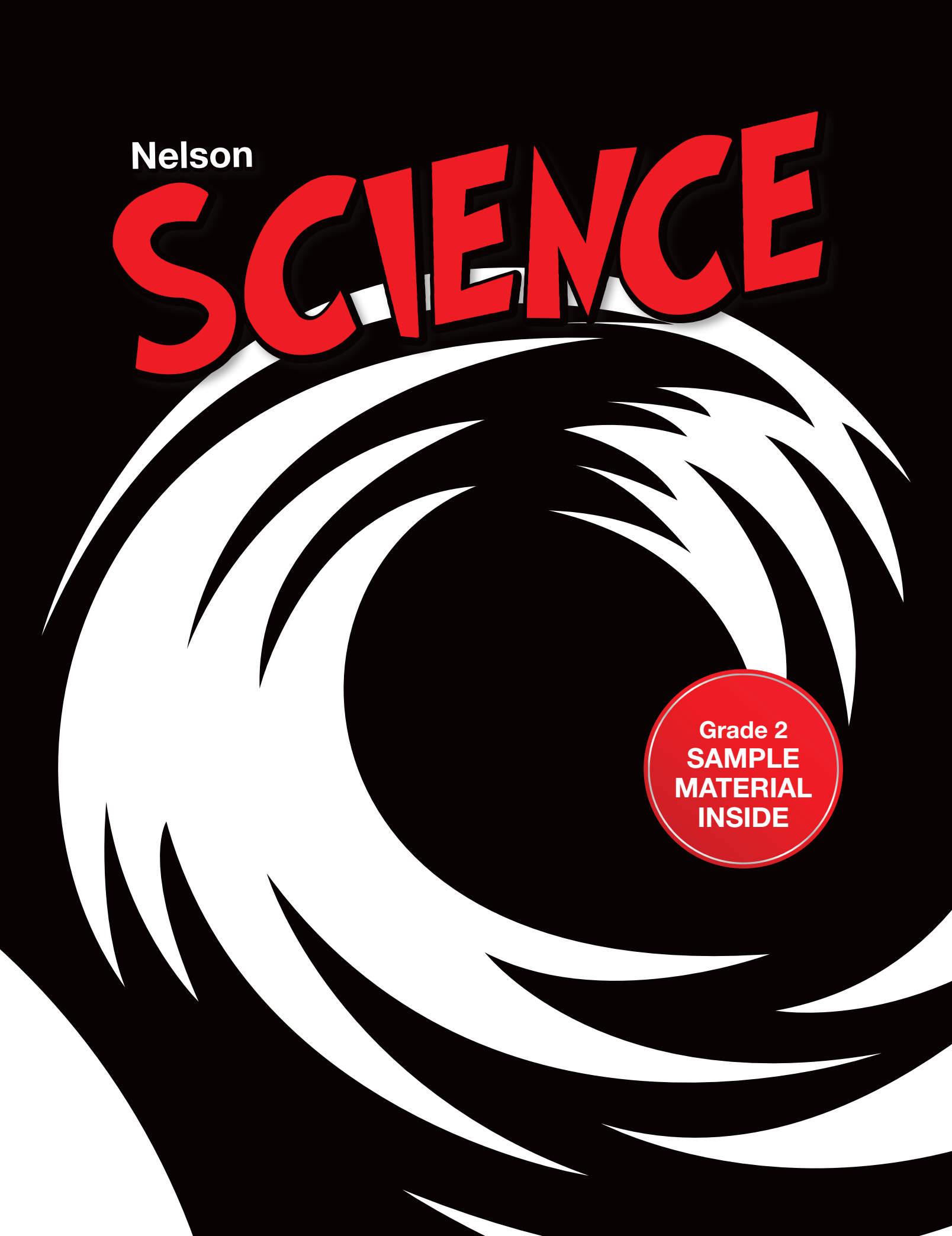
Nelson

SCIENCE



Grade 2
SAMPLE
MATERIAL
INSIDE

About Nelson Science

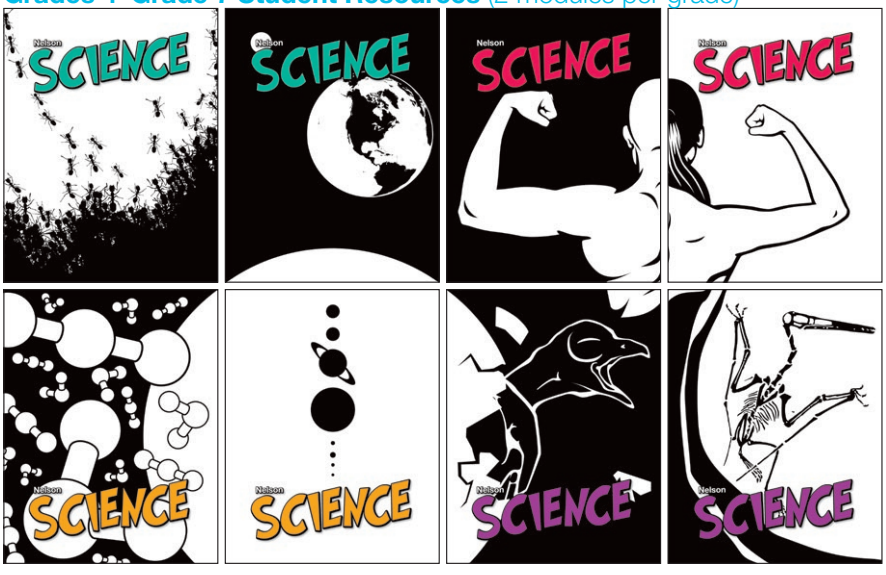
Developed by an experienced team of BC educators, *Nelson Science* is a comprehensive series built from the ground up to fully align with the new BC Science curriculum. Student resources feature activities designed to unleash students' innate curiosity. Infused with First Peoples knowledge and perspectives, and grounded in student-driven scientific inquiry, these resources open inquiry pathways that allow students to deepen their understanding of Big Ideas, develop Core and Curricular Competencies, and build place-based and content knowledge.

Key Features

- Focused on the doing of science—explorations and investigations are designed to develop the skills, processes, and habits of mind of scientific inquiry
- First Peoples scientific knowledge and perspectives are woven into activities through authentic contexts designed to support learning from First Peoples
- Design-focused activities allow students and teachers to cover all *Learning Standards* from the Applied Design, Skills, and Technologies (ADST) curriculum
- A suite of custom-developed, modifiable assessment tools, provide support for formative assessment of core and curricular competencies, as well as content knowledge

Kindergarten–Grade 3 Teacher's Resources

Grades 4–Grade 7 Student Resources (2 modules per grade)



Nelson SCIENCE

Resource Component Overview

For Students

Kindergarten–Grade 3

Activity Cards

- 9 double-sided, laminated Activity Cards featuring a unique activity on each side (total of 18 activities) to address all 4 strands: Biology, Chemistry, Physics, Earth/Space Science
- 8 copies of each Activity Card (total of 72 cards)
- Packaged in a durable cardboard box

Grades 4–7

Student Resource

- Flexible modular format—2 print modules per grade
- Each module contains 2 strands:
  - Biology and Chemistry
  - Physics and Earth/Space Science
- Online access to the Science Skills Toolkit

Online Student Centre (sold separately)*

- Each Online Student Centre provides:
  - 1 eBook containing 2 strands (includes audio read-aloud for struggling readers)
  - Science Skills Toolkit to support curricular competencies

***Contact your Sales Representative for more information.**

For Teachers

Kindergarten–Grade 3

Teacher's Resource
(includes Online Teaching Centre)

- Print Teacher's Resource with facilitation strategies and assessment support

Teacher Cards

- Double-sided, laminated cards to support place-based activities

Online Teaching Centre
(included with Teacher's Resource)

- Teacher's Resource eBook
- Image bank containing art and photos from the Activity Cards in JPG format
- Science Skills Toolkit with teaching notes to support curricular competencies
- Modifiable Blackline Masters (includes assessment tools)
- Interactive Whiteboard lessons for all 4 strands
- Videos with teaching notes
- Cross-curricular Connections with teaching notes
- Weblinks
- RSS feeds

Grades 4–7

Teacher's Resource
(includes Online Teaching Centre)

- Flexible modular format—2 print Teacher's Resource modules per grade
- Each module contains 2 strands:
  - Biology and Chemistry
  - Physics and Earth/Space Science

Online Teaching Centre
(included with Teacher's Resource)

- Teacher's Resource eBook containing 2 strands
- Image bank containing art and photos from the Student Resource in JPG format
- Science Skills Toolkit with teaching notes to support curricular competencies
- Modifiable Blackline Masters (includes assessment tools)
- Animations with teaching notes
- Videos with teaching notes
- Literature Connections with teaching notes
- Weblinks
- RSS feeds

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Teacher's Resource

Inquiring into...

Developing the Big Idea and Unifying Concepts identifies and explains the big idea and the unifying concepts that are addressed in the unit.

Multi-Year Classrooms highlights areas of potential combined instruction based on the content and big idea of the unit.

Using an Opening Provocation provides a suggested activity that teachers can use to begin the unit to engage students and elicit their natural questions about the conceptual content of the unit.

Inquiring into Forces

You Will Need

per student/group:
- smooth slopes (e.g., tilted books or small tilted whiteboards)
- a round object (e.g., a ball or marble)
- objects that could be used to move the round object up the slope (e.g., pencil, feather, cotton swab, string)

Resources Available in the Online Teaching Centre

Family Letter
Documenting Learning: Provocation: Up and down a slope
Weblinks

In this unit, students will use the skills, processes, and habits of mind of scientific inquiry to explore forces. They will investigate how different forces can influence the movement of a variety of objects. They will be able to construct their own knowledge of how force influences the movement of objects through hands-on activities and opportunities to design inquiries based on their own questions. If this is the first unit of the year, consider sending home **Family Letter**.

Developing the Big Idea and Unifying Concepts

The Big Idea for this unit is that **forces influence the motion of an object**. Students will engage in careful observation of a variety of types of contact and at-a-distance forces and grow to understand how different forces can influence the movement of a variety of objects.

As students explore different types of forces, they will be exploring the unifying concept of **cause and effect**. Cause and effect is the basic principle that an action will result in a consequence. However, a cause may or may not have a predictable effect. As students use a variety of forces in a variety of situations, they will often see that the effect of a force is that an object is moved or its motion is changed.

Multi-Year Classrooms

In Grade 1, students learned about how light and sound can be produced and their properties can be changed. In Grade 2, students will explore how force influences the motion of objects. In Grade 3, students focus on how thermal energy can be produced and transferred. Although the focus is different in Grades 1, 2, and 3, students in each grade are exploring forms and actions of energy.

Using This Provocation

The activity invites students to **demonstrate curiosity** about forces. The activity also encourages students in a naturalistic way to **ask questions about familiar objects and events** that can be investigated throughout the unit.

Science Background

In this unit, students will determine the connection between force and motion and what physical actions are necessary to change an object's motion. In this activity, they will look at how you can change the motion of a round object on a slope. They will notice that a round object easily rolls down a slope, with no need for them to apply any force. They will also notice that it is sometimes difficult to move a round object (e.g., a ball or a marble) up a smooth slope. Although they will

(continued)

Forces

This section provides teachers with a general overview of the unit. This section also notes any scientific descriptions and explanations that have recently been improved as new evidence became available.

not have learned this yet, gravity is pulling the ball down the slope, and if the surfaces of the ball and slope are smooth, there is little friction to slow it down. Students have to apply a force effectively to counteract gravity and move the ball up the slope. Students will likely think mostly of pushes they can apply to the ball, but it is possible to create a cage or a loop to go around the ball, for example, out of string, and pull the ball up the slope.

Observing and Supporting Learning

Observing and Supporting Learning suggests possible teaching strategies for engaging students in this unit.

- As students work on this activity, consider documenting evidence of learning using **Documenting Learning: Provocation: Up and down a slope**.
- To engage students in how force influences the motion of objects, ask them to make a variety of smooth slopes using books, small whiteboards, or other similar objects. Ask them to move a round object (such as a ball or a marble) up and down the slopes.
- As students investigate, challenge them to move the object with different materials, such as a finger, a pencil, a feather, a cotton swab, or string.
- Listen for students' observations and questions, and record them for further investigation.

Assessment Tool

Formative Assessment supports teachers with assessment strategies for observing students, adjusting instruction, and providing descriptive feedback.

Formative Assessment

Collecting Information	Using Information
Consider taking notes and/or photos to document the curiosity and wonder you see as students attempt to push or pull a marble or ball up a slope.	Consider giving students the photos to include in their science logs or portfolios and providing descriptive feedback to the whole class on their curiosity: *I could tell you were really curious about why it was so difficult to push the marble up the slope.*
Listen for questions or statements that can be turned into questions. Record and use these for further student-driven inquiry opportunities throughout the unit.	Provide whole-class feedback on the questions you heard: *Here are some of the questions I heard you asking. Did I miss any?*

Nelson SCIENCE

Teacher's Resource

Exploration

You Will Need is a list of materials teachers will need for the activity. *Resources Available in the Online Teaching Centre* is a list of resources in the Online Teaching Centre that can be used to support the exploration, such as Blackline Masters, Assessment Tools, and the Science Skills Toolkit.

The Focus Question identifies a key question that is derived from the learning standards for content knowledge.

Big Ideas and Unifying Concepts identifies how the doing and knowing of science can roll up toward the big idea and goals of the science curriculum.

Science Background provides a detailed overview of the science concepts covered in a given activity and, where applicable, addresses possible misconceptions.

What is a force?

You Will Need

per student/group:
- objects that students can push or pull that are a variety of shapes, sizes, and masses
- tools students can use to apply force to objects (e.g., string, elastics, rods, craft sticks)

Resources Available in the Online Teaching Centre

Documenting Learning: What is a force?
Scientific Inquiry Scale
Documenting Communication: Profiles
Documenting Communication: Facets
Documenting Critical Thinking: Profiles
Documenting Critical Thinking: Facets
Scientific Inquiry Toolkit (observe; question; use materials and tools safely; observe; record; identify patterns; evaluate; communicate observations, ideas and findings)
Weblinks

Using This Exploration

Curricular and Core Competencies: In this Exploration, students will have an opportunity to **demonstrate curiosity and a sense of wonder about the world** as they investigate how they can use contact forces to affect the motion of objects. They will **observe objects** in order to **ask questions**. They will **safely manipulate materials to test their ideas**, **make and record observations**, and **identify simple patterns and connections**. They will evaluate their inquiries as they **compare their observations with those of others**. They will **communicate their observations and ideas using oral or written language, drawing, or role-play**.

Students will develop the core competencies of **Critical Thinking (facet: question and investigate)** as they investigate using contact forces to affect the motion of objects and **Communication (facets: explain/recount and reflect)** as they communicate their observations and ideas about contact forces.

Focus Questions: What is a force? How can a force move objects?

Big Idea and Unifying Concepts: Contact and at-a-distance forces apply pushes or pulls. In this initial investigation, when students push or pull an object (cause), the object may move (effect). As they explore, it will help them construct the Big Idea that **forces influence the motion of an object** and develop the unifying concept of **cause and effect**.

Science Background

A force is defined as a push or a pull. In many everyday situations, force is applied when two objects come in direct physical contact with one another. For example, a stationary soccer ball will not move until you kick it with your foot. Forces that require physical contact between objects are known as contact forces.

There are other forces, at-a-distance forces, that do not require contact between objects, which include those applied by magnets (magnetism), mass (gravity), and charged objects (static electricity), which will all be addressed in this unit.

When forces are applied to an object, the object generally moves; however, there are exceptions. For example, Earth's gravity exerts a downward force on every object, but every object is not in motion relative to Earth. Suppose a book is sitting on a desk. It's not moving, but gravity always exerts a downward force. There must be an upward force acting on the book, equal in strength and opposite in direction to the gravitational force. The upward force is applied by the desk. This is an example of forces in balance. When two forces are balanced, they are equal in strength but operate in opposite directions. You can think of them as cancelling each other out in how they affect an object's motion.

(continued)

5A Forces

Curricular and Core Competencies identifies the curricular competencies (scientific skills and processes and habits of mind) that students will be using to build their science knowledge and any core competencies that they will have significant opportunities to develop.

If you apply a small horizontal push to the stationary book on the desk, and the book doesn't move, the force that you are exerting is not enough to overcome the opposing frictional force between the textbook and the surface of the desk. Now there are four forces in action, but all are balanced—the frictional force is equal in strength and opposite in direction to the applied force. If you slowly apply more and more force to the textbook, the textbook will eventually start to move. Your applied force is now greater than the frictional force; there is more force acting in one direction—the forces are unbalanced. An unbalanced force causes a change in an object's motion.

Possible Misconceptions

A very common misconception is that there are no forces acting on stationary objects. Stationary objects actually represent balanced force situations. It is important to emphasize that just because an object is not moving does not mean that there are no forces acting on the object. Students will understand this more clearly if you replace the book on the desk with a book on a student's upturned palm, and ask the student to keep the book motionless. The student will feel the force of gravity pulling the book down, and the opposite balancing force they have to apply with their muscles to keep the book motionless. Explain that the desk also has to apply a force to keep a book motionless.

Observing and Supporting Learning

- Consider using **Documenting Learning: What is a force?** to document your observations of learning as students respond to the images and do the activity in this Exploration.
- Observe students as they work, and highlight relevant sections of the **Scientific Inquiry Scale**.
- Place a book on a table and ask students how the book could be moved. Have a volunteer show how the book can be moved. Explain that the book did not move until the student applied a force. When enough force is applied, any object, like the book, can be moved.
- Roll a ball across a table or the floor, and ask how the motion of the ball can be stopped. Have a student demonstrate how to stop the ball. Explain that the student applied a force to stop the motion of an object. When force is applied to a moving object, the motion of the object is changed.
- Introduce, or review, the concept of **cause and effect**. Say, *If you push a book hard enough, it will move. The cause was the push; the effect was the motion of the book.* Give another example, such as, *If you put your hand on a rolling ball, what will the effect be?* Then ask students to work to make a class chart of cause and effect with examples about force. They can add to the class chart after the hands-on activity.
- Show students the Activity Card. Ask, *What forces are making the wagon move in the first picture? What is/are applying the forces? Are the forces a push or a pull or one of each?*

Assessment Tool

Assessment Tool

Literature Connections

Newton and Me by Lynne Mayer
Ask students questions such as, *What did the boy learn about pushing and pulling in this book?*

Unifying Concepts

Custom-developed, modifiable assessment tools support formative assessment of core and curricular competencies, as well as content knowledge.

Literature Connections, opportunities to integrate science concepts and skills while developing literacy skills, are presented in the margin.

Teacher's Resource

Exploration (continued)

Colour-coded icons, shown at point-of-use, act as identifiers for coverage of curricular goals, and core and curricular competencies.

Critical Thinking

- Turn students' attention to the second picture. Ask, *What is happening to the apples in the second picture? Are the apples moving? What must be causing the apples to move?*
- Explain to students that there are forces that can move an object without touching it. They act from a distance. Ask, *Is the force being applied to the apples a push or a pull? Can you tell?*
- Encourage students to ask questions about how to change the motion of objects using contact forces. They can use their observations of how they changed the motion of the book and the ball to help them generate questions. Encourage students to investigate these questions in the Try This! activity. For example, they may ask, Will this ball move if I push it lightly? Will this block move if I push it lightly? How hard do I need to push it? Is it easier to pull this object or to push it?

Formative Assessment	
Collecting Information	**Using Information**
Observe the extent to which students can use their observations of familiar objects being moved (e.g., a book and a ball) to generate questions about using contact forces to change the motion of objects.	Provide descriptive feedback to students using the language of the **Scientific Inquiry Scale**, for example, *You can ask questions about familiar objects and events.*

Try This! provides facilitation strategies for these hands-on activities on the Activity Cards, including notes about materials, safety precautions, and sample responses.

TRY THIS! Exploring contact forces

Purpose

To move a variety of objects (large and small, heavy and light) in a variety of ways to understand that when enough contact force is applied, an object will move

A Note about Safety

Ensure that students are not moving objects that can tip or fall, or objects that might be too heavy to lift.

Notes

- Provide students with a variety of objects to move, some that are easy to move (e.g., basketball, golf ball, or table tennis ball) and some that might be more difficult (e.g., cubes). Students should also have a variety of objects (e.g., elastics, string, rods) with which they can transfer force to an object.
- Ask students to discuss what they should do to work safely.
- Ask students to discuss their observations as they explore the changing motion of objects. For example, they may notice that some objects moved as soon as they applied a small force, and with other objects, they had to keep increasing the force until it finally moved. They may notice that different objects move differently depending on the strength and type of force they used. They may also notice that once an object begins to move, less force is needed to keep it moving. They may notice that the shape of objects can affect how much force is needed to get them moving (round versus flat/square). Although movement over different surfaces will be investigated later in the unit, students may notice that some surfaces slow movement more than others.
- Students could record their observations using drawings, photos, video, or words.

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- If this idea has not already come up, consider encouraging students to see what happens when two students push on opposite sides of an object at the same time. Ask, *If they push about the same amount, does the object move? What happens when one student pushes a little harder?* Explain that applying force does not always change the motion of an object. An object will only move when the forces acting on it are unbalanced.
- Encourage students to identify simple patterns and connections in their results, for example, relating the direction of the force they applied to the direction the object moves, and the size of the force they applied to the speed of movement of the objects. Students may notice that if they keep pushing on an object, it goes faster and faster.
- Ask students to compare their observations with one another to evaluate their investigations. Encourage them to discuss how their observations were similar to and different from those of others.
- Consider taking videos of discussions of their observations to keep as a record in students' science portfolios.
- Encourage students to use the language of **cause and effect** when discussing their observations. Ask if they have more examples of cause and effect to add to the class chart they started earlier.

Formative Assessment

Collecting Information	Using Information
Observe the extent to which students safely manipulate materials and tools to test their ideas about forces and motion.	If students are not using a material or tool safely, ask them to demonstrate how it could be done safely; if they cannot, demonstrate the safe technique yourself; then have them demonstrate it.
Observe the extent to which students make and record observations about how different contact forces change the motion of an object.	If students are having difficulty recording observations, consider adjusting instruction by scribing for them or helping them sketch pictures or take photos or video.
Observe the extent to which students identify simple patterns and connections in their observations. Consider asking questions to clarify and extend students' thinking, for example, *How did different strengths of forces affect the motion of the objects? Did some objects require more force to move?*	If students have difficulty identifying simple patterns and connections in their inquiry, consider adjusting instruction by asking them to think about differences in situations. For example, ask, *Did you push the same amount on this object as that object to make it move? What is different about the two objects?*
Observe the extent to which students evaluate their procedures by comparing their observations with those of others.	If some students learn about procedures from classmates that they would like to try themselves, consider adjusting instruction by providing time and materials to allow them to try the alternatives.
As students compare their observations with those of classmates, observe the extent to which students communicate their observations and ideas.	Consider providing descriptive feedback using the language of the **Communication Competency Profiles**, for example, *You can understand and share basic information. You can answer simple direct questions about your activities and experiences. You can understand and share basic information and participate in conversations to learn/share. You can recount simple experiences and activities and tell something you learned. You can recount and comment on events and experiences.*
Observe the extent to which students think critically as they conduct their investigation.	Consider providing descriptive feedback using the language of the **Critical Thinking Competency Profiles**, for example, *You can explore materials and actions. You can ask questions and use your senses to gather information. You can explore with a purpose in mind and use what you learn. You can find some evidence and make judgments.*

Identifying Inquiry Opportunities

- Students may have questions they can investigate about balanced and unbalanced forces. For example, Can we combine forces to move larger objects? Students may also want to investigate using force to resist movement.

Identifying Inquiry Opportunities scaffolds concrete suggestions for additional or alternative scientific inquiries based on students' own questions.

Teacher's Resource

Conduct an Inquiry!

You Will Need is a list of materials teachers will need for the activity. *Resources Available in the Online Teaching Centre* is a list of resources in the Online Teaching Centre that can be used to support the exploration, such as Blackline Masters, Assessment Tools, and the Science Skills Toolkit.

Big Ideas and Unifying Concepts identifies how the doing and knowing of science can roll up toward the big idea and goals of the science curriculum.

Learning from First Peoples links authentic First Peoples perspectives and scientific knowledge about the natural world to the skills and concepts in a given activity.

Conduct an Inquiry!
How do materials affect motion?

You Will Need

per student/group:
- irregularly shaped rock
- items to help pull the rock, such as elastics, string, duct tape, and/or masking tape
- items to help push the rock, such as sticks, bamboo skewers
- a large bucket or tub of water
- a sheet of ice (which could be made by freezing water in a large baking pan)

Resources Available in the Online Teaching Centre

Documenting Learning: How do materials affect motion?
Scientific Inquiry Scale
Documenting Communication: Profiles
Documenting Communication: Facets
Documenting Critical Thinking: Profiles
Documenting Critical Thinking: Facets
Scientific Inquiry Toolkit (observe; question; predict; use materials and tools safely; observe; measure; record; interpret results; evaluate; identify applications; generate new ideas and questions; communicate observations, ideas, and findings)
Weblinks

Using This Inquiry

Curricular and Core Competencies: In this place-based inquiry, students will **observe objects** in order to **ask questions** and **make simple predictions**. They will **safely manipulate materials to test their ideas**. They will **make and record observations** and **make and record measurements using informal or non-standard methods**. They will **compare their observations with their predictions through discussion**. They will evaluate their inquiries as they **compare their observations with those of others**. They will **generate and introduce new and refined ideas when problem solving** as they **transfer and apply their learning** to everyday problems, and in the process **take part in caring for self, family, classroom, and school through personal approaches**. They will **communicate their observations and ideas**.

Students will develop the core competencies of **Communication (facets: collaborate)** and **Critical Thinking (facets: question and investigate** and **develop and design)** as they investigate how materials affect the motion of objects and as they apply their learning to solve a challenge.

Focus Question: How do different materials influence the motion of an object?

Big Idea and Unifying Concepts: As students test the idea that the material an object is moving over or through (cause) often has an impact on how much force is required to move the object (effect), they develop their understanding of both the Big Idea that **forces influence the motion of an object** and the unifying concept of **cause and effect**.

Learning from First Peoples: Historically, First Peoples understood how to effectively push and pull objects across different surfaces. Some First Peoples groups invented the toboggan to pull heavy objects across snow. Other First Peoples groups invented the travois, used to help carry heavy loads across the prairies. Coastal First Peoples groups developed a system for hauling large logs up from the beach to build their Big Houses.

Science Background

In this inquiry, students will investigate how friction can affect motion. Students will investigate different materials and will discover that the nature of the materials used has a significant effect on any ensuing motion.

Friction is caused by small local attractions between the surfaces of two interacting materials, and also interactions between the uneven

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Place-based activities provide opportunities to do science outside the classroom and are identified with a tree icon.

surfaces in contact. Generally speaking, the smoother the surface that an object is on, the weaker the force of friction opposing the pushing or pulling force on the object.

Possible Misconceptions

Students may have the impression that friction is always a bad force, since it serves to impede motion. Friction, however, often works to their advantage. Friction between the rubber tires of a bike and the asphalt pavement, for example, enables the bike to proceed smoothly and safely around a curve without sliding. Friction is also what stops your bike when you rapidly apply the brakes.

Observing and Supporting Learning

- This **place-based** inquiry is an opportunity for students to develop **procedural knowledge** in Science as they use all the stages of scientific inquiry to investigate how materials influence the motion of an object.
- Consider using **Documenting Learning: How do materials affect motion?** to document your observations of students' scientific inquiry skills and processes as they conduct this inquiry.
- Observe students as they work, and highlight relevant sections of the **Scientific Inquiry Scale**.
- If you plan to observe with a core competency focus, consider using **Documenting Communication: Profiles** (or **Facets**), or **Documenting Critical Thinking: Profiles** (or **Facets**).
- Show students the Activity Card. Tell them they will be conducting an inquiry into how much force is required to move a rock over or through different materials.

Place-Based Activity

- Take students outside to an area that has several different surfaces available, such as grass, pavement, and playground woodchips. Consider also having a tub or large bucket of water available for students to explore water, and a sheet of ice (which could be made by freezing water in a large baking pan).
- Ask students to discuss ways that they and their classmates can be safe while investigating forces with rocks and other materials, and also how they can be respectful of the natural environment and landscape.
- Consider having students acknowledge the traditional First Peoples territory on which they will be learning.
- Ask students to take a quiet moment to observe and connect with nature in their environment.
- In Question and Predict, ask students to select a medium-sized rock and observe the different surfaces available to them. Tell students they

Goals

Assessment Tool

Assessment Tool

Assessment Tool

Teacher Card:
How do materials affect motion?

Critical Thinking

Custom-developed, modifiable assessment tools support formative assessment of core and curricular competencies, as well as content knowledge.

Teacher's Resource

Conduct an Inquiry! (continued)

Colour-coded icons, shown at point-of-use, act as identifiers for coverage of curricular goals, and core and curricular competencies.

Critical Thinking ▲

can use string and duct tape or masking tape (if necessary) to help them pull the rock across the surfaces. Encourage them to formulate a question about how different materials will affect the movement of their rock. For example, Will it be harder to move my rock through water than over ice? How much farther will a rock slide over ice than over playground woodchips? Will I need more force to pull my rock over grass or pavement?

- Ask students to make predictions about what they think will happen when they move their rock.

Formative Assessment	
Collecting Information	**Using Information**
Observe the extent to which students use their observation of the objects provided to generate questions about how surface materials affect the motion of objects.	If students have difficulty coming up with questions, consider adjusting instruction by having the whole class generate questions and then inviting students or small groups to choose one question to investigate.
Observe the extent to which students make predictions.	Provide descriptive feedback using the language of the **Scientific Inquiry Scale**, for example, *You can make simple predictions about familiar objects and events.*

- For Plan and Conduct, encourage students to think through how they will conduct their investigation, and provide support as necessary. Will they attach their rock to a string and pull it? Do they need duct tape or masking tape to help attach the rock to the string? Will they push the rock to slide it across the surface?
- Encourage students to make and record simple informal measurements of the force they require to move their rock. Most of students' data will likely be subjective opinions. Encourage students to investigate no more than two or three surfaces to help them compare more easily.

Formative Assessment	
Collecting Information	**Using Information**
Observe the extent to which students manipulate materials they've chosen safely and respectfully, taking into consideration their own safety and that of their classmates, and also the environment and landscape.	If students are not using a tool or material safely or respectfully, stop them and ask how their actions might be affecting their own safety, classmates, or other living things in the environment. Ask them to demonstrate how they could proceed safely/respectfully.
Observe the extent to which students make and record observations about the force required to move their rock across different surfaces, using informal or non-standard measurements. Ask questions to clarify and extend students' thinking, for example, *What are you observing? How will you know when you have answered your question? What do you need to record to show that you have answered your question?*	If students have difficulty making and recording observations, consider adjusting instruction by suggesting some methods; for example, if they are using elastics to pull items, they could observe how far the elastic stretches. If they are using flexible items (bamboo skewers) to push their object, they can observe how much they bend.

- For Analyze, after students have gathered their data, ask them to compare their observations with their predictions.

▲ Critical Thinking

- For Evaluate, ask students to compare their observations with those of their classmates and discuss what they may have done differently.

▲ Communication

- For Apply, allow time and materials for students to design and test their ideas. Students may want to investigate surfaces such as ice, pavement, their desk, a counter, or the floor. For example, students may have experience with sand being used to add traction in the winter, but adding sand to a smooth floor will make it more slippery. Students might also think about rubber shoes that have better grip compared to shoes with smooth soles.

▲ Critical Thinking

- For Communicate, ask students to demonstrate to the class their ideas for making a surface less slippery.

▲ Communication

Formative Assessment

Collecting Information	Using Information
Observe the extent to which students compare their observations with their predictions.	Provide descriptive feedback, for example, *You knew your prediction was correct because your observations supported it. You realized your prediction was wrong after you made observations. That is why, in science, we always test our predictions.*
Observe the extent to which students evaluate their procedures by comparing their observations with those of others.	Provide descriptive feedback to students, for example, *I see you are thinking about how your inquiry may have been conducted in a different way than the other group's.*
Observe the extent to which students demonstrate care for self, family, classroom, and school through personal approaches.	Provide descriptive feedback for students, for example, *You are showing that you can care for your schoolmates by making sure the hallway floor doesn't get slippery around the water fountain.*
Observe the extent to which students transfer and apply their learning to this new situation of making a surface less slippery.	If students are having difficulty transferring their learning, ask them what materials were the most difficult to move the rock over, and how this information can be used to make a smooth surface rougher.
Observe the extent to which students think critically as they conduct their inquiry.	Consider providing descriptive feedback using the language of the **Critical Thinking Competency Profiles**, for example, *You can explore materials and actions. You can ask questions, make predictions, and use your senses to gather information. You can explore with a purpose in mind and use what you learn. You can find some evidence and make judgments.*
Observe the extent to which students collaborate to investigate the effect materials have on the motion of objects.	Consider providing descriptive feedback using the language of the **Communication Competency Profiles**, for example, *You can be part of a group. You can work with others; you do your share. When you talk and work with peers, you express your ideas and encourage others to express theirs.*

- Some students may wish to document this activity as an example of their **Communication Competency** or **Critical Thinking Competency**, depending on what they see as their strengths in the activity.

Activity Card

Exploration

Explorations present content in an engaging visual format. Each Activity Card is supported in the Teacher's Resource by strategies that support the associated learning standards.

What is a force?

A force can cause a change in the motion of an object.

A force can be a push or a pull.

Contact forces

Some forces need to touch the object.

5A Forces

At-a-distance forces

Some forces do not need to touch the object.

TRY THIS!

Exploring contact forces

Move an object by pushing or pulling it with something.

Activity Card

Conduct an Inquiry!

The *Scientific Inquiry Toolkit*, available in the Online Teaching Centre, supports the development of the procedural knowledge of scientific inquiry.

The activities associated with *Conduct an Inquiry!* activity cards are full inquiries. Students set their own specific question and decide how they will plan and conduct their investigation.

Conduct an Inquiry!

How do materials a

Question and Predict

Predict how different materials will affect the movement of a rock.

Plan and Conduct

Make and record observations and measurements.

7B Forces

ffect motion?

Analyze

Sort and classify your data.

Evaluate

Compare results with your classmates.

Apply

Use what you learned to make a surface less slippery.

Communicate

Show what you learned.

Conduct an Inquiry! uses the headings for scientific inquiry from the BC curriculum as indicators for the stages of inquiry.

Activity Card

Design and Make!

The *Design Toolkit*, available in the Online Teaching Centre provides additional support for the skills and processes of design.

Design and Make!

Make a toy with mag

Ideate

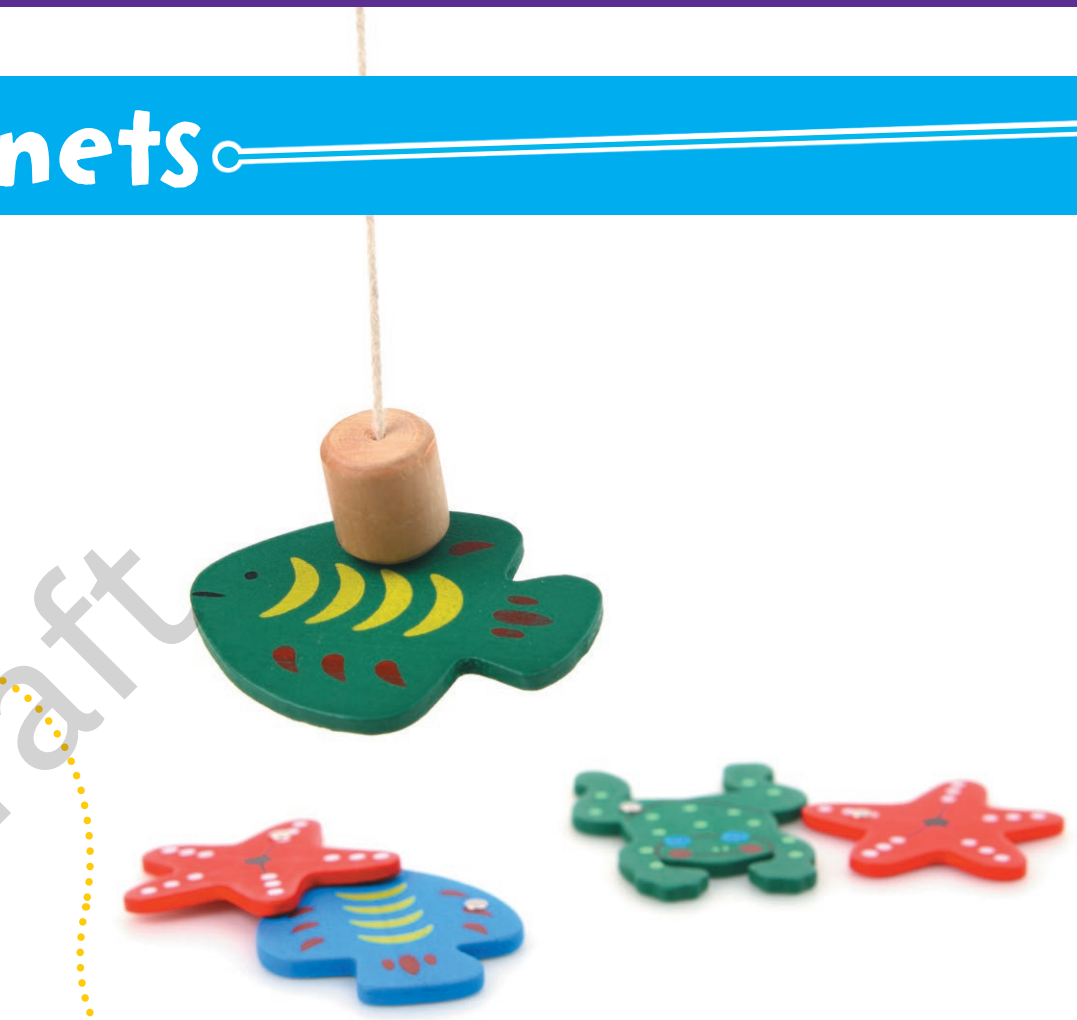
Think of ways you can use magnets to make a toy.

Make

Choose your tools and materials.

6A Forces

nets



Share

Does your idea work?
Share your toy.

There is one *Design and Make!* activity in each unit that supports implementation of the ADST curriculum and allows students to develop their design thinking in relation to science topics.

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SCIENCE

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