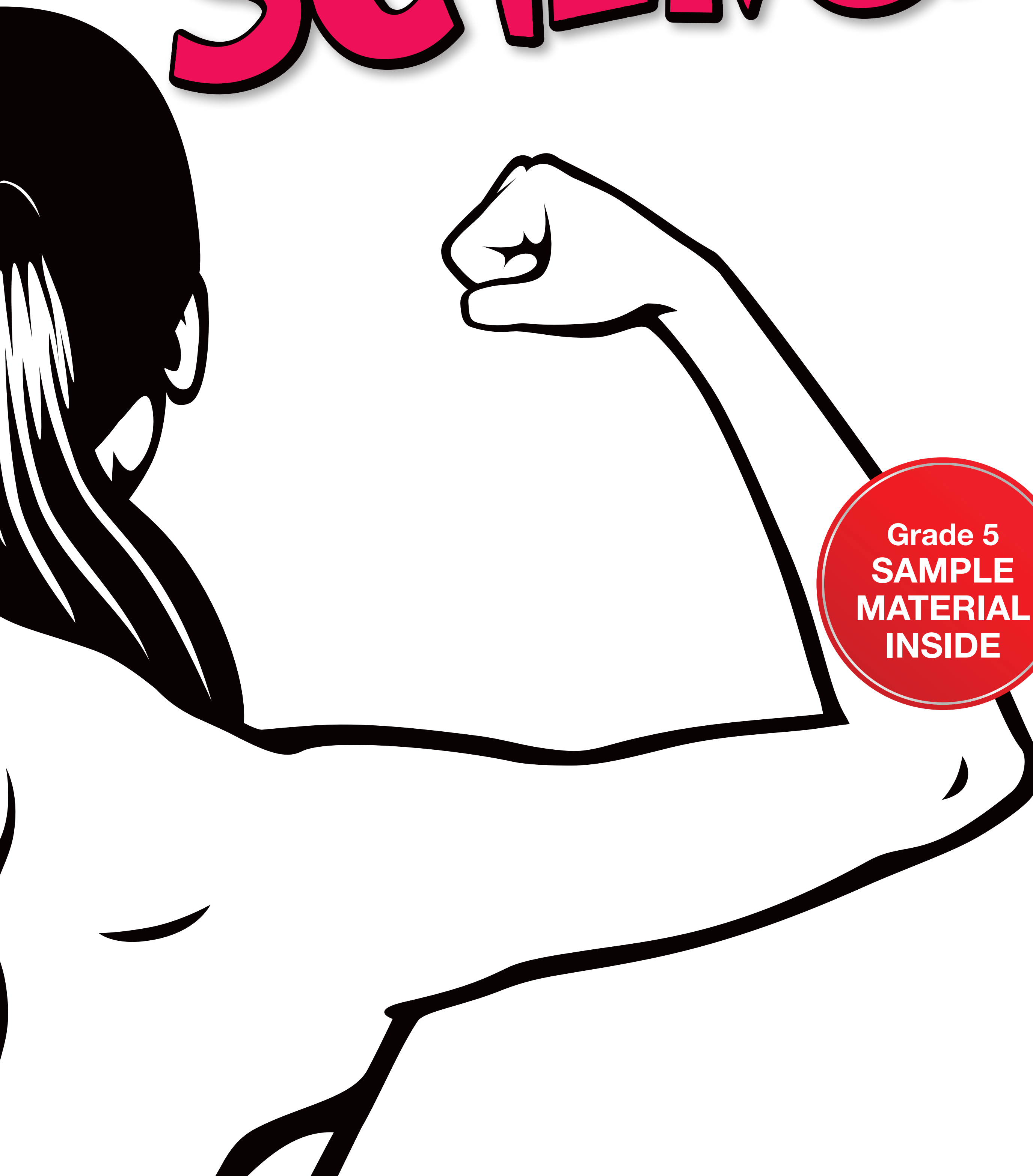
Nelson

SCIENCE



Grade 5
SAMPLE
MATERIAL
INSIDE

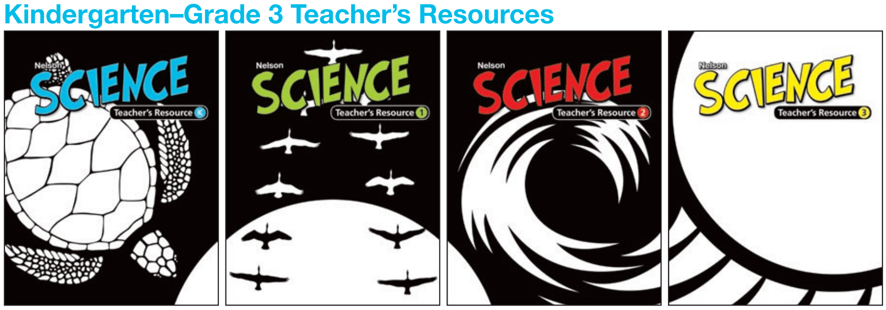
About Nelson Science

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.

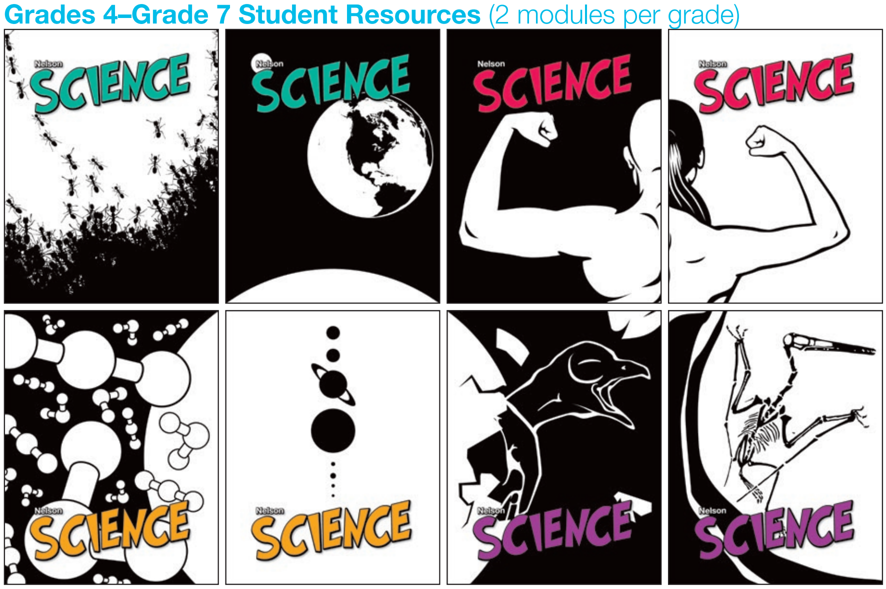
Key Features

- 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)



Resource Component Overview

For Students

Kindergarten–Grade 3	Grades 4–7
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	**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	Grades 4–7
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	**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

Student Resource

Unit Opening Provocation

The opening image is visually engaging and is connected to the unit content or the curricular provocation.

MACHINES

Lifting Forces on the Level

Place a metre stick on the floor, and attach an object to one end of it. Keeping the metre stick horizontal and using only one hand, lift the metre stick and object off the floor. Compare the force needed to lift the object when you place your hand at different positions along the stick.

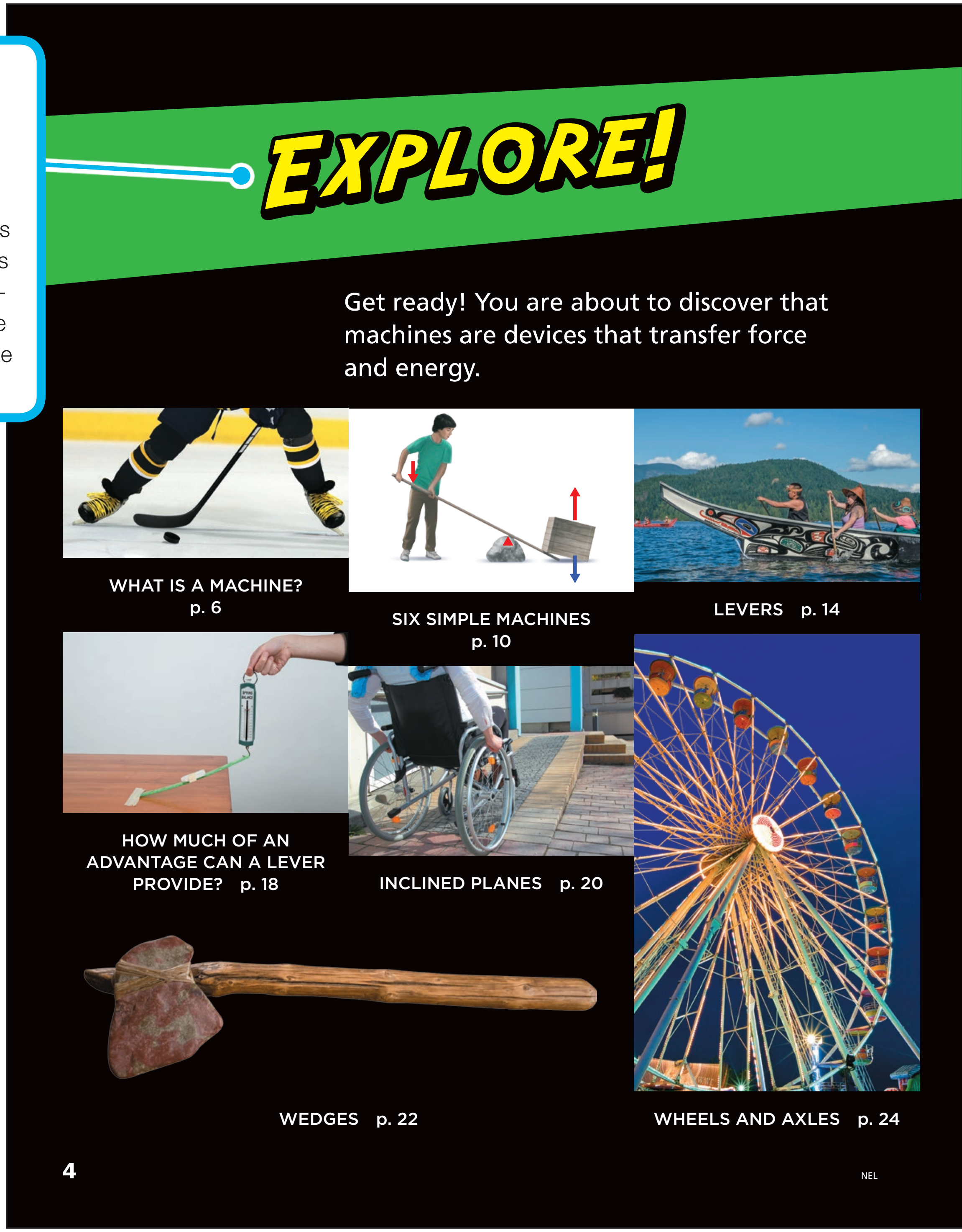
NEL 3

The unit opening activity is always a curricular provocation. The high-interest activity is intended to engage students and elicit their naturalistic questions about the conceptual content of the unit.

Student Resource

Explore!

Explore!, located after the unit opening provocation, provides a visual overview of the key topics in a unit. It replaces traditional tables of contents and supports more nonlinear, curiosity-driven approaches to the exploration of the science concepts in a unit.



EXPLORE!

Get ready! You are about to discover that machines are devices that transfer force and energy.

WHAT IS A MACHINE? p. 6

SIX SIMPLE MACHINES p. 10

LEVERS p. 14

HOW MUCH OF AN ADVANTAGE CAN A LEVER PROVIDE? p. 18

INCLINED PLANES p. 20

WEDGES p. 22

WHEELS AND AXLES p. 24

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SCREWS p. 28

PULLEYS p. 30

HOW CAN PULLEY SYSTEMS AFFECT MECHANICAL ADVANTAGE? p. 34

COMPLEX MACHINES p. 36

AN AMAZING MACHINE p. 40

POWER p. 44

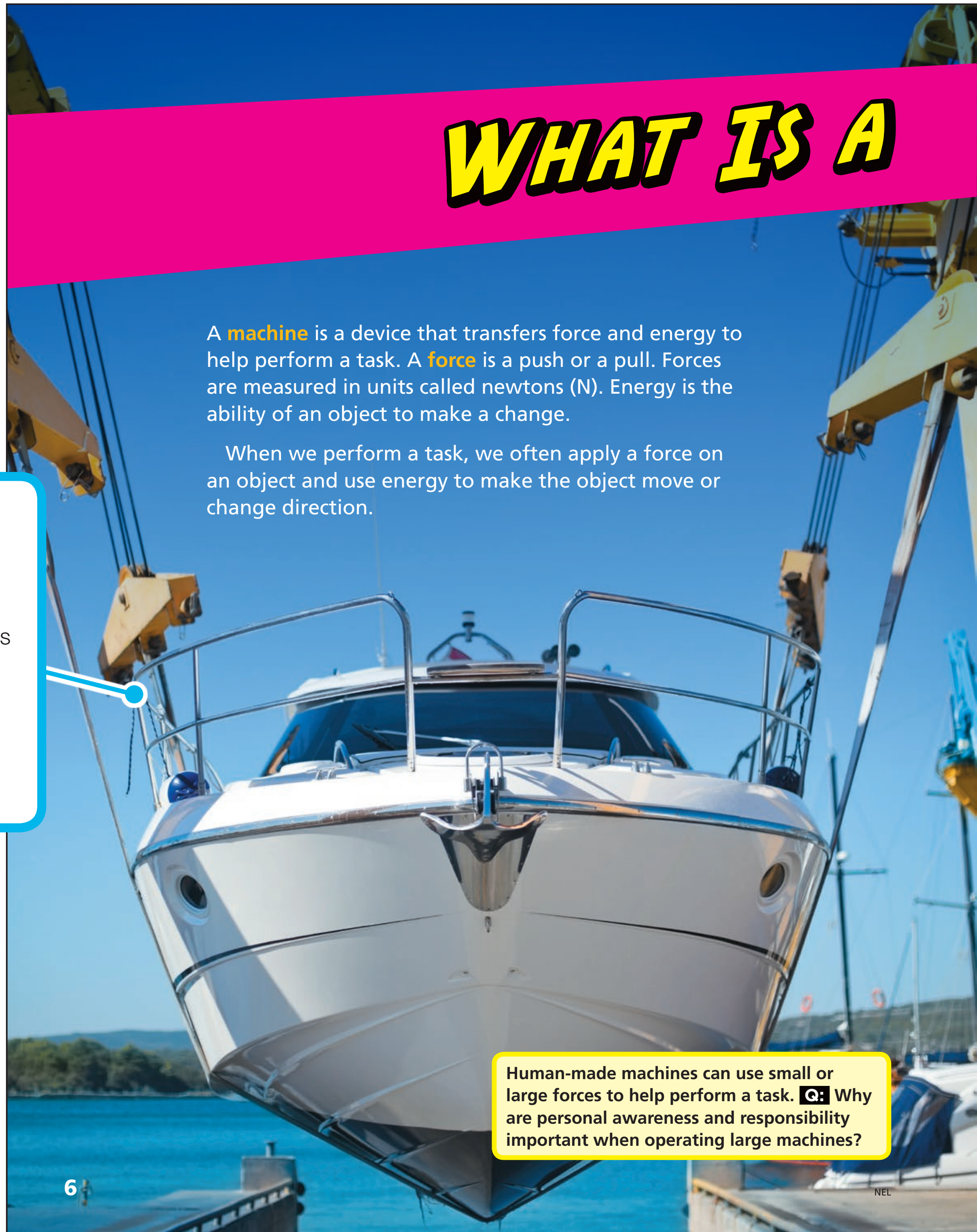
HOW CAN WE HELP OTHERS WITH A MACHINE? p. 46

APPLICATIONS AND INNOVATIONS p. 48

Student Resource

Exploration

High-impact images directly relate to key concepts and provide some of the content of the lesson. These images offer opportunities for differentiated instruction and to show rather than tell students about the concepts.


WHAT IS A

A **machine** is a device that transfers force and energy to help perform a task. A **force** is a push or a pull. Forces are measured in units called newtons (N). Energy is the ability of an object to make a change.

When we perform a task, we often apply a force on an object and use energy to make the object move or change direction.

Human-made machines can use small or large forces to help perform a task. Q: Why are personal awareness and responsibility important when operating large machines?

6 NEL

MACHINE?

Explorations present conceptual content. They often include one or more hands-on *Try This!* activities.

Some machines help you perform a task that requires a large force while you apply a small force.

The benefit of having an output force greater than the input force is called a force advantage. This person is using a jack to lift a car off the ground. Q: Why is the advantage provided by the jack called a force advantage?

Captions are informative and can include questions and/or activity suggestions that can serve as entry points into the science content and springboards for inquiry.

NEL 7

Student Resource

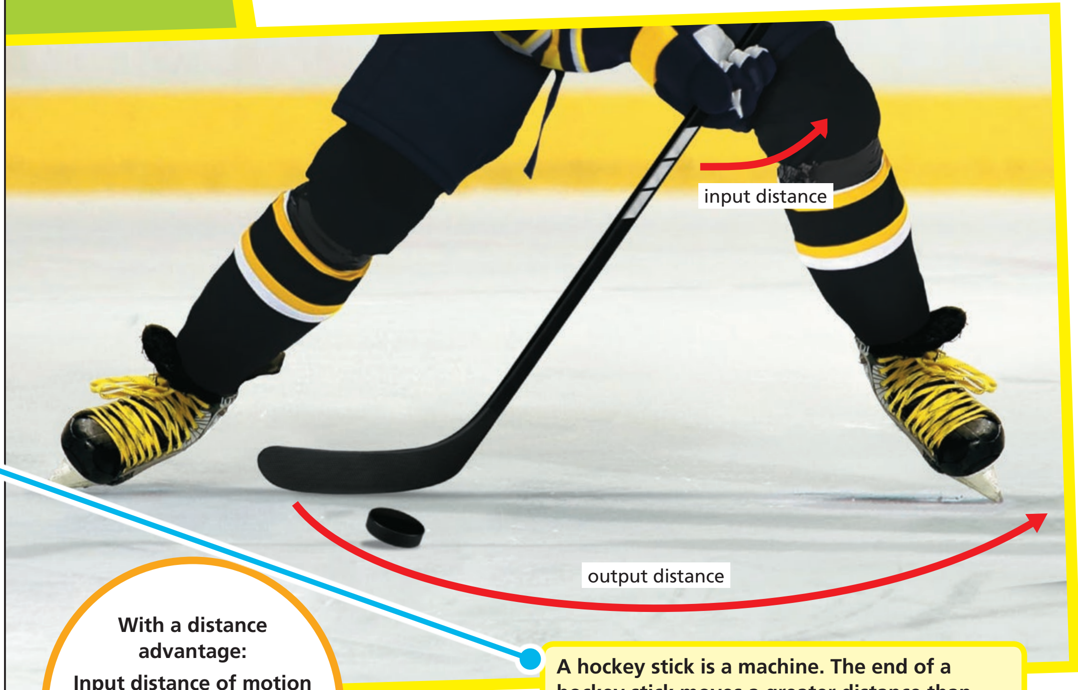
Exploration (continued)

Small narrative passages, often featuring local contexts, are written in student-friendly language and provide essential knowledge through engaging real-world contexts.

Questions throughout the narrative help students make connections, check their understanding, or extend their thinking.

Some machines let you perform a task that increases distance instead of force. Machines with a **distance advantage** allow the user to move a short distance while causing the object to move a much greater distance.

How a machine influences the size of the output force is its **mechanical advantage**.



With a distance advantage:

Input distance of motion is *less than* output distance of motion.

Output motion is *faster than* input motion.

A hockey stick is a machine. The end of a hockey stick moves a greater distance than the handle end. Q: How might this distance advantage influence the speed of the shot?

Nelson SCIENCE

Living things use their body parts to perform tasks. Many human-made machines are based on how living things use their body parts to give them mechanical advantage.

This dragonfly uses its wings to generate the forces needed to fly. Q: What machines have humans invented that are modelled on the wings of animals?

TRY THIS! Look for Mechanical Advantage

Go outside to look for living things using their body parts to perform tasks, and for people using machines to perform tasks.

1. Take a moment to quietly connect with the natural world.
2. Observe for examples of animals, including humans, using their body parts to perform tasks. Look for evidence of pushing or pulling forces. How does the body part move as the task is being performed? Record your observations.
3. Observe for examples of people using machines to perform tasks. Look for evidence of pushing or pulling forces. How do the parts of the machine move as the task is being performed? Record your observations.
4. Do you think the people could have done the tasks without machines? Explain.
5. How were the use of the body parts and the machines the same?
6. How did comparing the use of body parts to human-made machines make you feel more connected to the natural world?

NEL 9

Try This! activities are structured activities that provide students with opportunities to develop science skills and conceptual understandings by doing science.

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

Student Resource

Conduct an Inquiry!

Conduct an Inquiry! sections are full scientific inquiries. Students set their own specific question and decide how they will plan and conduct their investigation.

Conduct an Inquiry!

HOW MUCH OF CAN A LEVER

In this inquiry, you will investigate how you can change the force or distance advantage of a lever.

Question and Predict

Think about the different types of levers and the force or distance advantage they can provide. What factors influence these advantages? Choose a factor and identify the question you will investigate. Make a prediction about how your chosen factor will influence mechanical advantage.

Plan and Conduct

Plan your investigation. Which variable will you change? Which variable will you measure? What materials and equipment will you need? Are there any potential safety risks? How will you handle them? How will you record your observations and measurements?

Conduct your investigation. Observe, measure, and record data.

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AN ADVANTAGE PROVIDE?

Process and Analyze

Construct a table or graph with your data. Identify any patterns or relationships in your data. Was your prediction correct?

Evaluate

Was your investigation a fair test? What were some possible sources of error? How could you improve your investigation methods?

Apply and Innovate

Choose a practical task that would be easier with a force or distance advantage. Work in a small group to design a lever for the task.

Conduct an Inquiry! uses the headings for scientific inquiry from the BC curriculum and prompts students through the inquiry stages.

Communicate

Share your findings with the class. Explain the process you used, and your ideas and explanations about your results. Respond to questions.

Which of your personal strengths and abilities helped you do this scientific inquiry?

What new questions do you have?

Nelson SCIENCE

Student Resource

Design and Make!

There is one *Design and Make!* activity in each unit that supports implementation of the BC Applied Design, Skills, and Technologies (ADST) curriculum and allows students to develop their design thinking in relation to science topics. These open-ended design activities invite students to come up with their own design ideas and choose one to act on.

Design and Make!

HOW CAN OTHERS WITH

A young child, an elderly person, or someone with a physical disability may need extra assistance to perform a task. In many cases, all they need is a well-designed simple or complex machine.

Understand the Context

Gather some information on challenges faced by people when performing simple everyday tasks. Identify a machine that could help them. Determine the needs and concerns of users of your machine.

Define

Identify a specific task for which you could design a machine. Identify key features and user requirements. Are there any constraints, for example, available materials?

Ideate

Generate potential ideas and add to others' ideas. Screen your ideas against the user requirements and the constraints. Choose an idea to pursue.

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We Help a Machine?

Prototype

Develop a general plan that identifies the tools and materials you will need. Construct a first version of your machine, making changes to tools, materials, and procedures as needed.

Test

Test your prototype. Gather feedback and ideas from classmates. Make changes to your machine and retest. Record the changes you make.

Make

Make a final version of your machine that includes all your planned changes.

Share

Decide if you will keep and use your machine, share it with others, or give it to someone who needs it.

Demonstrate your machine. Describe your design process. How well did you and your group share and maintain a co-operative workspace as you built your machine.

Does your machine do what you intended it to do? Identify any new design issues you or someone else could work on.

NEL

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Design and Make! activities in the Student Resource use the headings for the design process from the ADST curriculum and prompt students through the design stages.

The *Design Toolkit*, available online, provides additional support for the skills and processes of design.

Student Resource

Unit Closing Activity

The closing activity in each unit is one of three types:

Knowledge-Building Circle: Students come together in a circle to pose questions and revisit, refine, and consolidate their ideas. The circle promotes a non-hierarchical approach, and encourages attentive listening.

Applications and Innovations: Students work individually or in small groups as part of a whole-class jigsaw activity to identify real-world applications and innovations, locally and globally, which are based on what they learned in the unit, and present the results in a manner of their choosing.

Take Action!: Students apply what they learned to come up with a personal or collaborative project to support the well-being of self, family, the community, or the land. The activity encourages deeper understanding and promotes learning from First Peoples.

Applications and Innovations

Research some new machine innovations that have been developed or invented to benefit us, our community, or the environment. Work individually, with a partner, or in a small group. In a class presentation, identify the simple machines and the actions or motions involved for each device. Explain how the new machine is useful.

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NEL


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Teacher's Resource

Inquiring into...

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.

Inquiring into Simple Machines

You Will Need

per student or group:
- metre stick or other solid bar or stick about 1 m long
- mass, between 0.5 kg and 1 kg, such as a plastic milk jug partially filled with water
- hook or string

Resources Available in the Online Teaching Centre

Family Letter
Documenting Learning: Lifting Forces on the Level

In this unit, students inquire into simple machines. They will use the skills, processes, and habits of mind of scientific inquiry to explore constructed machines, machines found in nature, and power as the rate at which energy is transferred. If this is the first unit of the school year, consider distributing **Family Letter**.

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

Developing the Big Idea and Unifying Concepts

The Big Idea for this unit is **machines are devices that transfer force and energy**.

The unifying concepts for this unit are **cause and effect** (machines use input forces to produce an output force and perform a task) and **systems** (complex machines are made by combining a number of simple machines together as a system).

All machines produce an output force in response to an input force; this represents a cause and effect response. All machines have movement—when a force is applied over a distance, energy is used and transferred from the source of the input force to the object on which the output force acts (load).

Machines are made up of one or more components that act together to form a system. Complex machines are two or more simple systems combined into larger systems containing more interacting components—the output from one component is the input for the next component.

The image on the unit opening pages shows three Cirque du Soleil acrobats balancing on tightropes with poles.

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

Multi-Year Classrooms

In Grade 4, students learn about the various forms of energy, that energy is conserved, and that devices transform energy. In Grade 5, students learn that machines are constructed and found in nature, and that power is the rate at which energy is transferred. In Grade 6, students learn about Newton's three laws of motion, the effects of balanced and unbalanced forces in daily activities, and the force of gravity.

Using This Provocation supports the opening activity in the Student Resource.

Using This Provocation

Goals

This Provocation invites students to develop a **sustained curiosity about a scientific topic or problem of personal interest** related to simple machines as they lift an object with their hands at various positions on a metre stick. The activity is intended as a naturalistic way for students to **identify questions to answer or problems to solve through scientific inquiry**, especially in relation to mechanical advantage, that they can investigate as they progress through this unit.

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STUDENT RESOURCE PAGES 2–3

Science Background

The device being modelled in the activity is a lever. The metre stick represents the lever arm, and the mass represents the load. The lifting hand acts as both the fulcrum and the source of the input force. Students will observe that the greater the distance the load is from the fulcrum (hand), the greater the input force needed to lift it.

When using tightropes, the long pole acts to increase the resistance to rotation of the system, making it more stable. The resistance to motion can be used to balance any unwanted shifting of weight to the right or left. For example, if the walker starts to lean slightly to the right, she can apply a downward force on the right side of the pole and "push off" against the pole and correct her lean. If the pole were very short, it would move too easily and not offer any useful resistance.

The pole also curves down at the ends, making the system more stable. The tightrope walker's arms can also be thought of as a very long simple lever, with the mass of each half of the pole acting as a load. Because the hands of the walker are on either side of the middle of the pole (which can be thought of as the location of the fulcrum), it takes a relatively large force to tilt the pole in either direction. This makes the tightrope walker more stable if she maintains a solid grip on the pole; a small force such as a slight gust of wind would not have as great an effect on the walker–pole system.

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

Observing and Supporting Learning

- A container such as a plastic milk jug partially filled with water can be used as the mass for this activity.
- Consider using **Documenting Learning: Lifting Forces on the Level** to record your observations of students demonstrating curiosity and the questions you hear them ask as they try to lift the mass. Curiosity and questioning are important **habits of mind** of science.
- Students will observe that it is more difficult to lift the mass if their hand is far from the load, and easier when their hand is very close to the load.
- Students may want to move the position of the mass as well. Although not necessary, doing so would provide further evidence that the difference in the distance between the load and the lifting force is the key variable.

Assessment Tool

Goals

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

Formative Assessment

Collecting Information	Using Information
Listen for evidence of curiosity about levers as students try to lift an object with a lever.	Provide descriptive feedback to acknowledge curiosity and encourage students to sustain it. For example, *You seem to have a lot of curiosity about this topic. As we go through the unit, let me know if I can help you find additional sources of information.*
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. For example, *Here are some of the questions I heard you asking. Did I miss any?* This communicates to students that questions are valued in your science classroom. A valuing of questions is an important **habit of mind** in science and the driver of scientific inquiry.

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Teacher's Resource

Exploration

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.

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

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.

What Is a Machine?

Resources Available in the Online Teaching Centre

Try This! Look for Mechanical Advantage
Field Guide Entry
Place-Based Learning Reflection
Scientific Inquiry Report
Two-Column Chart
Scientific Inquiry Scale
Documenting Learning: What Is a Machine?
Documenting Communication: Profiles
Documenting Communication: Facets
Self-Assessment: Communication: Facets
Self-Assessment: Communication: Prompts
Documenting Critical Thinking: Profiles
Documenting Critical Thinking: Facets
Self-Assessment: Critical Thinking: Facets
Self-Assessment: Critical Thinking: Prompts
Scientific Inquiry Toolkit (observe, observe, record, identify patterns, communicate findings and ideas, reflect on place)
Weblinks

Using This Exploration

Curricular and Core Competencies: In this Exploration, students will learn how machines can provide a mechanical advantage to help perform tasks. In the place-based Try This! activity, students will go outside to **make observations in familiar contexts**. They will **experience and interpret the local environment** as they look for animals using their body parts to perform tasks. They will then look for people using machines. Students will **observe, measure, and record data, using appropriate tools, including digital technologies**, and **identify patterns and connections** between the use of body parts and the use of machines. They will **communicate their ideas, explanations, and processes**, and **express and reflect on personal experiences of place**.

Students will be developing the core competencies of **Communication (facet: explain/recount and reflect)** as they communicate their ideas and explanations of their place-based investigation, and **Critical Thinking (facet: analyze and critique)** as they answer the questions about mechanical advantage.

Focus Question: What is a machine?

Big Idea and Unifying Concepts: In this Exploration, students are introduced to the Big Idea that **machines are devices that transfer force and energy**. As students examine how machines use an input force (cause) to change the motion of an object (effect), they will be exploring the unifying concept of **cause and effect**. As students see that machines consist of components that work together as a **system**, they will be developing their understanding of the second unifying concept of the unit.

Learning from First Peoples: Observation and awareness of the natural world are key elements for First Peoples and how one learns about their environment. Encouraging students to observe the natural world in different ways, such as exploring for machines found in body parts of humans and animals, promotes respect and awareness of the natural world.

Science Background

A *machine* is any tool that uses energy to perform a specific task. A machine can perform its task by a variety of means:

- transforming energy
- transferring force from one location to another
- changing the size of a force
- changing the direction of a force

The purpose of machines is to make tasks easier for us to do. The utility of a machine can be measured by comparing the size of the

(continued)

STUDENT RESOURCE PAGES 6–9

output force that the machine provides with the size of the input force supplied by the user, or by comparing the distance travelled by the input force compared to the distance travelled by the output force. The comparison of input to output forces is called the machine's *mechanical advantage*. Generally speaking, if distance is not a primary concern, machines are considered useful if the output force produced by the machine is greater than the input force from the user. A car jack, for example, is a useful machine because it allows us to raise a car, something that we would not be able to do with our bare hands. In other words, many useful machines act as force multipliers.

It appears on the surface that machines seem to give something for nothing; that we get more out than we put in. This, however, is not the case. The total energy going into the system must equal the total energy going out of the system (i.e., the law of conservation of energy). A machine may well act as a force multiplier, but it does this at the expense of distance. The total input energy must, however, equal the total output energy. A machine makes the user's input work easier.

Some machines, such as bicycles, are considered useful because they provide a distance advantage—when travelling at high speed, the bicycle wheels are moving faster and through a greater distance than the pedals. While this requires a greater input force than output force (a force disadvantage), it allows us to travel at much higher speeds than we could travel otherwise.

Possible Misconceptions

Some students may think that a machine is a complex piece of mechanical equipment, not something as simple as a baseball bat or a door handle. A machine is a device—constructed or found in nature—that uses energy to help perform a task.

Learning from the Land

In the Try This! activity, students will learn about machines in nature by making observations on the land.

Learning from the Land provides teaching strategies and prompts when place-based learning opportunities arise.

Observing and Supporting Learning

- Consider using **Documenting Learning: What Is a Machine?** to document your observations of student learning as students respond to the images and text, and do the activity in this Exploration. — Assessment Tool
- Mechanical advantage is important **conceptual knowledge** that is foundational to the study of forces. — Goals
- If you plan to observe for students' core competency development, consider using **Documenting Critical Thinking: Profiles** (or **Facets**) to record observational notes. — Critical Thinking; Assessment Tool

Teacher's Resource

Exploration (continued)

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

Formative Assessment

Collecting Information	Using Information
Do a quick check for understanding using the traffic light method with the following prompt: *How well do you understand the difference between force advantage and distance advantage?* Green means "Go on, I understand," yellow means "Caution, I'm not sure about this," and red means "Stop, I don't understand."	If there are any red or yellow responses, consider having students Think-Pair-Share the difference and generate examples. Use the knowledge that students share to make a t-chart with examples of force advantage machines and distance advantage machines.
Observe the extent to which students think critically as they answer the questions about mechanical advantage.	Consider providing descriptive feedback using the language of the **Critical Thinking Competency Profiles**. For example, *You can tell or show something about your thinking. You can find some evidence and make judgments. You can use your observations, experience, and imagination to draw conclusions and make judgments. You can describe your thinking and how it is changing.*

SAMPLE RESPONSES

Q: Why are personal awareness and responsibility important when operating large machines?

R: Machines can be very powerful and cause damage to the environment and property, and injury to humans and other living things if not used properly. You need to have proper training to use a large machine safely.

Q: Why is the advantage provided by the jack called a force advantage?

R: It is called a force advantage because it takes only a small input force to produce a large output force, a force large enough to lift a car, which is something a person could never do without the jack.

Q: How might this distance advantage influence the speed of the shot?

R: The distance advantage causes a speed advantage. If the end of the stick moves farther than the hands in the time it takes the player to make a shot or pass, then it must also be going faster because speed is how far something moves in a certain time.

Q: What machines have humans invented that are modelled on the wings of animals?

R: Airplanes are modelled on the wings of birds.

Goals
- The Try This! activity is an outdoor activity that helps students acquire **place-based knowledge and experience**.

Blackline Master
- You may wish to hand out **Try This! Look for Mechanical Advantage** to provide students with a copy of the activity to use outdoors.

Blackline Master
- Consider having students use **Scientific Inquiry Report** to record their observations and analysis, and to include the completed report in their science log or portfolio.

Blackline Master
- Some students may wish to complete **Field Guide Entry** and include it in their science logs, portfolios, or field guides.

Assessment Tool
- Observe students as they work on the Try This! activity, and highlight relevant sections of the **Scientific Inquiry Scale**.

Communication
Assessment Tool
- If you plan to observe for students' core competency development during the Try This! activity, consider using **Documenting Communication: Profiles** (or **Facets**) to record observational notes.

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Nelson SCIENCE

TRY THIS! Look for Mechanical Advantage

Purpose

To provide an opportunity for **place-based learning** while identifying examples of constructed machines and machines in nature.

Notes

- Suggest that students focus on tasks that involve obvious motions and forces. While activities such as seeing and thinking do involve forces and motions at the cellular level, students cannot observe these activities directly. Therefore, they are not suitable for inquiry-based learning at the Grade 5 level.

Sample Responses

2. I can observe squirrels using their limbs to climb trees. Perhaps the squirrels are pulling themselves up the tree. I see birds using their wings to fly. The wings go up and down. When the wings flap, perhaps they are pushing on the air.

3. I can observe people riding bicycles. They push down on the pedal and the back wheel turns, moving the bicycle and the rider forward.

4. The bicycle rider can do the task without the bicycle, but it would take much longer to go the distance than with the bicycle.

5. The uses of the body parts and the machines were the same in that, in each case, there was an application of force (push or pull) to make movement. The bicycle gives a distance advantage. A bird's wings give a force advantage.

6. Comparing body parts to human-made machines made me feel more connected to the land because I realized that many of our ideas for machines probably came from our observations of nature.

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

- While students are still outdoors or upon returning indoors, invite them to complete **Place-Based Learning Reflection** and to include the reflection in their science logs, portfolios, or field guides.

Blackline Master

Formative Assessment

Collecting Information	Using Information
Observe the extent to which students make observations in familiar contexts to identify constructed machines and experience the local environment to identify machines found in nature.	If students have difficulty identifying machines, adjust instruction by asking them to look for evidence of motion and the application and/or generation of forces. Whenever a force is applied over a distance, energy is applied to perform a task.
Observe the extent to which students are able to observe, measure, and record data about machines using appropriate tools, including digital technologies.	If students have difficulty recording their observations, consider having them document their observations using photos and videos or making sketches, which can be used later in the classroom for additional processing of the data.
Observe the extent to which students are able to identify patterns and connections between the use of body parts and the use of machines. (Both involve either a force or distance advantage.)	If students have difficulty identifying the patterns and connections between the use of body parts and the use of a machine, consider adjusting instruction by asking them to work with a partner or in a small group and use **Two-Column Chart**, Force Advantage, Distance Advantage, to classify the use of body parts and constructed machines.
Observe the extent to which students are able to express and reflect on personal experiences of place.	If students have difficulty reflecting on their experiences of place, adjust instruction by directing students to the questions in the Reflect on place section of the **Scientific Inquiry Toolkit**.

Identifying Inquiry Opportunities

Students may wish to simulate a motion of a piece of sporting equipment, such as swinging a racquet, and compare the distance travelled by their hand to the distanced travelled by the end of the racquet.

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

Nelson SCIENCE

Teacher's Resource

Conduct an Inquiry!

You Will Need is a list of materials teachers will need for any activities in the section.

Online Teaching Resources Available in the Centre Resources 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.

Conduct an Inquiry! How Much of an Advantage Can a Lever Provide?

You Will Need

per student or group:

- a variety of items that could be used as a lever, fulcrum, and load, such as metre sticks, dowelling, weights, and water bottles
- tape
- spring scale
- string or hook

Resources Available in the Online Teaching Centre

Scientific Inquiry Report
Scientific Inquiry Process
Scientific Inquiry Scale
Scientific Inquiry Self-Assessment Scale
Documenting Learning: How Much of an Advantage Can a Lever Provide?
Documenting Communication: Profiles
Documenting Communication: Facets
Self-Assessment: Communication: Facets
Self-Assessment: Communication: Prompts
Documenting Critical Thinking: Profiles
Documenting Critical Thinking: Facets
Self-Assessment: Critical Thinking: Facets
Self-Assessment: Critical Thinking: Prompts
Documenting Positive Personal and Cultural Identity: Profiles
Documenting Positive Personal and Cultural Identity: Facets
Self-Assessment: Positive Personal and Cultural Identity: Facets
Self-Assessment: Positive Personal and Cultural Identity: Prompts
Scientific Inquiry Toolkit (identify testable questions; predict; plan procedures; identify and control variables; observe; measure; record; use materials, tools, and equipment safely; compile and display data; identify patterns; draw conclusions; evaluate procedures; identify possible sources of error; collaborate; identify applications; act on new ideas and questions; communicate findings and ideas)
Weblinks

Using This Inquiry

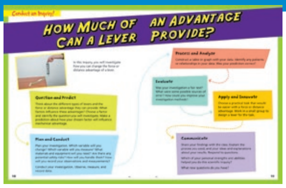
Curricular and Core Competencies: In this activity, students will use all the stages of scientific inquiry to investigate how they can change the force or distance advantage of a lever. They will **identify a question to answer through scientific inquiry**, and **make a prediction about the findings of their inquiry**. They will **plan an appropriate investigation to answer the question they have identified, decide which variables should be changed and measured for a fair test**, and **choose appropriate data to collect to answer their question**. Students will **use equipment and materials safely, identifying potential risks**, and **observe, measure, and record data, using appropriate tools, including digital technologies**. They will **construct and use a table to represent patterns and relationships in their data**, and **identify patterns and connections in data**. They will **demonstrate an understanding and appreciation of evidence** as they **compare their data with their predictions and develop explanations for results**. They will **evaluate whether their investigations were fair tests, identify possible sources of error**, and **suggest improvements to their investigation methods**. Students will **transfer and apply their learning** to **co-operatively design** a lever for a practical task. They will **generate and introduce new or refined ideas when problem solving**. Students will **communicate their ideas, explanations, and processes** to classmates and respond to questions.

Students will be developing the core competencies of **Communication (facets: collaborate, connect and engage with others)** and **Critical Thinking (facet: question and investigate)** as they conduct their scientific inquiry, and **Positive Personal and Cultural Identity (facet: personal strengths and abilities)** as they identify which of their personal strengths and abilities helped them do this scientific inquiry. They will also be developing the core competency of **Critical Thinking (facet: develop and design)** as they transfer their learning to design a lever for a practical task.

Big Idea and Unifying Concepts: In this Conduct an Inquiry!, students continue to explore the Big Idea that **machines are devices that transfer force and energy** in the context of levers as they investigate how the output force represents a transfer of the input force by the lever, and the change in motion of the load represents the transfer in energy by the lever.

By manipulating and measuring variables to observe how a change in the system (position of the fulcrum, length of the lever arm, etc.) influences the output force, the effect, the inquiry will help students explore the unifying concept of **cause and effect**.

STUDENT RESOURCE PAGES 18–19



Science Background

Mechanical advantage is a quantity that determines how useful a machine is; it is a measure of how much a machine multiplies the input force that is put into it. Mathematically, mechanical advantage is expressed as the ratio of the output force to the input force (mechanical advantage = (output force) / (input force), or MA = F_{out} / F_{in}). Note, however, that students are not expected to calculate this ratio.

A certain Class 1 lever, for example, is used to lift a load of 12 N. An input force of 3 N is required to lift this load. The mechanical advantage of this particular Class 1 lever is, therefore, equal to 4 (MA = F_{out} / F_{in} = 12 N / 3 N = 4). Note that mechanical advantage is a quantity that has no units; the units cancel out.

A mechanical advantage of 1 means that the output and input forces are equal. The only value of using a simple machine with this particular arrangement of forces would be to change the direction of the applied force. A Class 1 lever would have a mechanical advantage of 1 if the output and input forces were located the same distance from the fulcrum.

A mechanical advantage greater than 1 means that the output force is greater than the input force. This is an extremely useful arrangement and allows us to lift heavy loads with a smaller input force. A Class 2 lever always has a mechanical advantage greater than 1. A Class 1 lever also has a mechanical advantage greater than 1 as long as the input force is located a greater distance from the fulcrum than the output force.

A mechanical advantage less than 1 means that the output force is always less than the input force. A Class 3 lever always has a mechanical advantage less than 1. A Class 1 lever can also have a mechanical advantage less than 1 if the input force is located closer to the fulcrum than the output force.

Possible Misconceptions

Students may believe that a simple machine with a mechanical advantage greater than 1 is somehow easier to use than a simple machine with a mechanical advantage less than 1. Sugar tongs and tweezers, for example, are quite easy to use, but each has a mechanical advantage that is less than 1. The benefits of tongs are apparent during everyday use—they have advantages even though they have a mechanical disadvantage.

Observing and Supporting Learning

- This inquiry is an opportunity for students to develop **procedural knowledge** in Science as they pose questions that lead to investigations, and plan appropriate investigations to answer their questions. Students will also develop their understanding and appreciation of the **nature of science** as an evidence-based way of knowing the natural world. They develop their **scientific literacy** by using the skills and processes of science to build knowledge about the relationship between the position of the fulcrum relative to the load and input forces, and to see the relationship between the direction and size of the output force and distance.

Goals

Teacher's Resource

Conduct an Inquiry! (continued)

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

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

Assessment Tool

- Consider handing out **Scientific Inquiry Process**. Review the process of scientific inquiry if necessary. Remind students that support for the skills listed is available in the **Scientific Inquiry Toolkit**. If there are particular skills you want students to focus on in this inquiry, ask them to highlight those skills.

Blackline Master

- Consider asking students to use **Scientific Inquiry Report** to record their work, and to include the completed report in their science log or portfolio.

Assessment Tool

- Consider using **Documenting Learning: How Much of an Advantage Can a Lever Provide?** to document your observations of students' scientific inquiry skills and processes as they do this investigation.
- Observe students as they work, and highlight relevant sections of the **Scientific Inquiry Scale**.

Assessment Tool

Communication

Critical Thinking

Positive Personal and Cultural Identity

Assessment Tool

- If you plan to observe for students' core competency development, consider using **Documenting Communication: Profiles** (or **Facets**), **Documenting Critical Thinking: Profiles** (or **Facets**), or **Documenting Positive Personal and Cultural Identity: Profiles** (or **Facets**) to record observational notes.
- In Question and Predict, have students think about which arrangement of lever, load, and input force they wish to investigate, and which relationships they are interested in. Questions might include the following: How can I arrange a lever to lift a large load with the least amount of force? How can I arrange a lever to move a load a large distance or rapidly with only a small or slow movement by the input force?
- Remind students that predictions should be based on prior knowledge and that they should be able to explain the reasons for the predictions they make.

Formative Assessment

Collecting Information	Using Information
As students use their learning about levers from the previous Exploration to identify a question to investigate, ask questions to clarify and extend their thinking. For example, *What did you observe about the levers that you are still curious about?*	If students have difficulty writing testable questions, provide additional instruction using the suggestions in the Tips for Teachers under Identify testable questions in the **Scientific Inquiry Toolkit**.
As students make predictions about how their chosen variable will influence mechanical advantage, ask questions to clarify and extend their thinking about the prior knowledge they are using to make their predictions. For example, *What prior knowledge or experience did you use to make that prediction?*	If students do not seem to be using their prior learning about levers to make predictions, adjust instruction by asking students to use the following sentence frame for their prediction: *We predict that… because…*

- In Plan and Conduct, ask students to decide what they will use for the lever, and the object they will choose for the load. They must also consider how they will attach the load securely to the lever, and how they will apply an input force to the simple machine.
- Consider providing digital or video cameras for students to use to document many of the features that could then be measured in detail later.

Formative Assessment

Collecting Information	Using Information
Observe the extent to which students are able to plan an investigation to answer their question.	If students are having difficulty planning their investigation, refer them to the Plan and Conduct section of the **Scientific Inquiry Toolkit**, and provide them with direct support if necessary.
Observe whether students can decide which variable should be changed and which variable should be measured (input force or load distance) for a fair test.	If students have difficulty deciding which variable should be changed and which variable should be measured, provide additional instruction using the suggestions in the Tips for Teachers under Identify and control variables in the **Scientific Inquiry Toolkit**.
Observe the extent to which students are able to identify appropriate data to collect (input force or load distance) to answer their question.	If students have difficulty identifying how to collect data or make a plan to record it, consider adjusting instruction by grouping them into two groups, based on whether they are investigating force advantage or distance advantage, to plan together.
Observe the extent to which students are able to identify potential risks.	If you have to say "no" to certain procedures for safety reasons, provide students with descriptive feedback that gives reasons for your decisions.

- In Process and Analyze, students are asked to construct a table or graph. They may wish to present their data in a graph. For example, they could plot input force versus distance to fulcrum.

Formative Assessment

Collecting Information	Using Information
Observe the extent to which students can observe, measure, and record data on how their chosen variable influences force or distance advantage.	Provide descriptive feedback about students' observations. For example, *I see you made a table with columns to record the distance the load moved and the distance the input force moved.*
Observe the extent to which students are able to identify patterns in their data that help them understand the relationship between the variable they chose to change and the measured variable.	If students have difficulty identifying patterns in their data, consider adjusting instruction by having students who changed the same variable pool their data and work as a class to identify patterns and relationships.
Observe the extent to which students can compare their data with their predictions.	If some students are not mentioning the evidence from their data when they are evaluating their predictions, adjust instruction by asking them to use a sentence frame that requires it. For example, *Our prediction was/was not correct, because… [evidence].*

- In Evaluate, students should evaluate their procedures. Did they control all variables properly? For example, was the fulcrum positioned carefully in each trial? Did they measure the input force accurately?

Cross-Curricular Consideration

As students identify potential safety risks and use equipment and materials safely, they will also be developing a curricular competency and a content learning standard in the Career Education 5 curriculum about safety in a variety of environments.

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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.

Formative Assessment

Collecting Information	Using Information
Observe the extent to which students can evaluate whether their investigations were fair tests.	If students have difficulty evaluating whether their investigations were fair tests, adjust instruction by pointing out that a fair test is about controlling variables: only one variable is changed at a time and everything else, as much as possible, is kept exactly the same. Then have them assess their own procedures to see if only one variable was changed. If some students have difficulty assessing this, suggest that they ask a classmate to be a “critical friend” and assess their procedures, and offer to do the same for them.
As students evaluate their procedures, listen for evidence that they are identifying possible sources of error.	If students have difficulty identifying possible sources of error, adjust instruction by asking them to consider the questions in the Evaluating procedures section of the **Scientific Inquiry Toolkit**.
Observe whether students are able to suggest improvements to their procedures.	If students suggest ways they could improve their procedures, adjust instruction by providing time and support for them to redo their inquiry with the improved procedures to see if they get better data.

Cross-Curricular Consideration

As students identify which of their personal strengths and abilities helped them do this inquiry, they will also be developing a curricular competency of the Career Education 5 curriculum: identify and appreciate their personal attributes, skills, interests, and accomplishments, and their growth over time.

- In Apply and Innovate, students choose a practical task that would be easier with a force or distance advantage, and then in a small group, design a lever for the task. Students can measure the performance of their new lever and judge whether they think it would be a successful/suitable device.
- In Communicate, students are asked to explain their processes, ideas, and explanations with the class and respond to questions. This could be done in a small-group format or as an entire class. Students can discuss the merits of different experimental designs and summarize what the class has learned about levers and mechanical advantage.

Formative Assessment

	Collecting Information	Using Information
Critical Thinking	Observe the extent to which students think critically as they transfer and apply their learning to design and develop a lever for a practical task.	Consider providing descriptive feedback using the language of the **Critical Thinking Competency Profiles**. For example, *You can explore with a purpose in mind and use what you learn. You can explore, gather information, and experiment purposefully to develop options. You can explore and engage with materials. You can consider more than one way to proceed and make choices based on your reasoning and what you are trying to do.*
Communication	Observe the extent to which students are able to collaborate as they co-operatively design a lever for a practical purpose.	Consider providing descriptive feedback using the language of the **Communication Competency Profiles**. For example, *You can be part of a group. You plan and complete activities with classmates. 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; you share roles and responsibilities. You contribute to planning and adjusting a plan, and help solve conflicts or challenges.*

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Formative Assessment

Collecting Information	Using Information
Observe the extent to which students can communicate their ideas, explanations, and processes.	If students have difficulty thinking of an effective way to present, adjust instruction by having them consider using PowerPoint or Prezi, photos, videos, or other digital formats. Consider providing descriptive feedback using the language of the **Communication Competency Profiles**. For example, *You can be part of a group. You can talk and listen to people you know. You can communicate with classmates. You can participate in conversations to learn/share. You listen and respond to others. You are becoming an active listener; you ask questions and make connections.*
Observe for the development of students' positive personal and cultural identity as they identify which of their personal strengths and abilities helped them do this inquiry.	Consider providing descriptive feedback using the language of the **Positive Personal and Cultural Identity Competency Profiles**. For example, *You can identify some of your individual characteristics. You can describe and demonstrate pride in your positive qualities, characteristics, and/or skills. You can explain how you are able to use these to contribute to your home and/or community. You understand that your characteristics, qualities, strengths, and challenges make you unique, and are an important part of the communities you belong to (including people and places).*
Observe for the development of students' critical thinking skills 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 ask open-ended questions, explore, gather information, and experiment purposefully. You can use observation, experience, and imagination to draw conclusions and ask new questions. You can gather and combine new evidence with what you already know to develop reasoned conclusions.*

Communication

Positive Personal and Cultural Identity

Critical Thinking

- Ask students to highlight applicable "I can" statements on the **Scientific Inquiry Self-Assessment Scale**. If some students have difficulty self-assessing accurately, conference with them individually.
- Some students may wish to document this activity as an example of their **Communication, Critical Thinking**, or **Positive Personal and Cultural Identity** competency in Science, and complete a self-assessment using **Self-Assessment: Communication: Facets** (or **Prompts**), **Self-Assessment: Critical Thinking: Facets** (or **Prompts**), or **Self-Assessment: Positive Personal and Cultural Identity: Facets** (or **Prompts**).

Communication
Critical Thinking
Positive Personal and Cultural Identity
Assessment Tool

Identifying Inquiry Opportunities

Students may wish to investigate an everyday example of a lever, but should be made aware that taking measurements may be difficult due to the size of the forces—they may be too large to measure using available spring scales. So, an inquiry of an everyday example of a lever that uses modest forces is useful, such as a shovel. Safety should always be considered.

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

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Teacher's Resource

Design and Make!

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.

Design and Make! How Can We Help Others with a Machine?

You Will Need

per student or group:
- rulers or sticks for lever arms
- wheels and axles, if available
- string
- pulleys
- tape or glue
- cardboard
- assorted nuts and bolts with matching wrenches or screwdrivers

Resources Available in the Online Teaching Centre

Design Log
Design Process
Design and Make! Share Stage
Scientific Inquiry Scale
Scientific Inquiry Self-Assessment Scale
Design Scale
Design Self-Assessment Scale
Documenting Learning: How Can We Help Others with a Machine?
Documenting Communication: Profiles
Documenting Communication: Facets
Self-Assessment: Communication: Facets
Self-Assessment: Communication: Prompts
Documenting Creative Thinking: Profiles
Documenting Creative Thinking: Facets
Self-Assessment: Creative Thinking: Facets
Self-Assessment: Creative Thinking: Prompts
Documenting Critical Thinking: Profiles
Documenting Critical Thinking: Facets
Self-Assessment: Critical Thinking: Facets
Self-Assessment: Critical Thinking: Prompts
Documenting Social Responsibility: Profiles
Documenting Social Responsibility: Facets
Self-Assessment: Social Responsibility: Facets
Self-Assessment: Social Responsibility: Prompts
Design Toolkit
Weblinks

Using This Design and Make!

Curricular and Core Competencies: This activity uses the curricular competencies of all stages of the design process—Understanding Context, Defining, Ideating, Prototyping, Testing, Making, and Sharing—as well as the four curricular competencies under the Applying and Innovating section of the Science curriculum.

As students design a machine that can be used to help a young child, an elderly person, or someone with a physical disability, they will be developing the core competencies of **Communication (facets: collaborate** and **explain, recount and reflect), Creative Thinking (all facets), Critical Thinking (facet: develop and design)**, and **Social Responsibility (facet: contributing to community)**.

Big Idea and Unifying Concepts: Designing and making a simple or complex machine provides students with an opportunity to demonstrate the Big Idea that **machines are devices that transfer force and energy**, as well as the unifying concepts of **cause and effect** and **systems**. The activity also supports the ADST Big Ideas that **designs can be improved with prototyping and testing; skills are developed through practice, effort, and action**; and **the choice of technology and tools depends on the task**.

Science Background

The device pictured in the Design and Make! activity is a *sock aid*. The device is useful for those who cannot reach their feet easily, perhaps because of arthritis, joint damage, or injury.

A sock aid is made up of a wedge-shaped device and a cord. In this case, there is no mechanical advantage associated with the wedge; it is the shape that is important because it holds the sock open so that the foot can slide in easily. Once the sock is over the wedge and the foot inserted, the user can pull the sock up. At the same time, the wedge is pulled up too, but the sock is on the foot.

Observing and Supporting Learning

- Consider planning to have students do the first three stages of the design process—Understand the Context, Define, Ideate—and under Prototype, develop their general plan that identifies tools and materials on one day, and then allow time for you or students to assemble materials before moving on to building the prototype and completing the remaining stages of the design process on a subsequent day.
- Consider handing out **Design Process**. Review the stages of design, if necessary. Remind students that support for each stage of the design process is available in the **Design Toolkit**. The Toolkit also provides tips for teachers.

Blackline Master

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STUDENT RESOURCE PAGES 46–47

- Consider asking students to use **Design Log** to record their design process. Their record might be a combination of notes, photographs, or other formats.
- Consider using **Documenting Learning: How Can We Help Others with a Machine?** to document your observations of students' design processes as they design and make their product.
- In Understand the Context, ask students to gather information about or from potential users. Students should think about how people are normally able to apply a directed force when performing the task and how a machine might be able to help.
- In Define, encourage students to identify a specific task that some people need assistance with so that they do a better job of identifying key features and user requirements. The main constraint students are likely to identify is available materials.
- For Ideate, encourage students to think creatively and to be open to building on the ideas of others. Part of the design process is to withhold judgment on ideas until later in the process. As students screen their ideas against user requirements, remind students to be sensitive when discussing other people's conditions.
- For Prototype, have students outline a general plan that identifies tools and materials. As students build the first prototype, encourage them to make changes to their tools and materials as necessary.
- In Test, students test their machines, ask for feedback from their peers, and make changes until they are satisfied with their product. It may be necessary to remind students to record iterations of prototyping.
- In Make, students construct the final version of their machine, incorporating the changes they made during prototyping.
- In Share, students will choose what to do with their product—keep it, give it to someone who could use it, or use it as an example for other designers to build on. Then ask students to demonstrate their machine and describe their design process to classmates using the question prompts in **Design and Make! Share Stage**.

Blackline Master

Assessment Tool

Blackline Master

Formative Assessment

Collecting Information	Using Information
Observe students as they work through the design process.	If students are having difficulty with any of the steps, provide additional instruction based on the Tips for Teachers in the **Design Toolkit**.

Blackline Master

- Ask students to highlight applicable "I can" statements on the **Design Self-Assessment Scale**. If some students have difficulty self-assessing accurately, conference with them individually.

Blackline Master

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Teacher's Resource

Unit Closing Activity

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.

Applications and Innovations

Resources Available in the Online Teaching Centre

Documenting Learning: Applications and Innovations
Documenting Communication: Profiles
Documenting Communication: Facets
Self-Assessment: Communication: Facets
Self-Assessment: Communication: Prompts

Using This Closing Activity

Curricular and Core Competencies: In this closing activity, students will research new machine applications that have been developed or invented to benefit individuals, the community, or the environment.

Students will be developing the core competency of **Communication (facet: acquire, interpret, and present information)** as they do research and make a presentation.

Focus Question: What machine-related applications and innovations have been developed that benefit others?

Big Idea and Unifying Concepts: In this activity, students have an opportunity to deepen their understanding of the unifying concepts of **cause and effect** and **systems**, and the Big Idea that **machines are devices that transfer force and energy** as they research how others have developed machine-related applications and innovations that could benefit individuals, communities, or the environment.

Observing and Supporting Learning

- The wrap-up activity provides an opportunity for students to research new and innovative machines designed to help us perform tasks.
- Students might choose to work individually, with a partner, or in small groups to identify real-world applications and innovations that involve a newly invented or redesigned device. The activity promotes additional research and learning while underlining the relevance of scientific learning.
- Students may wish to research innovations related to a particular activity of interest, such as new types of sporting equipment, the latest bicycle or car design, or the latest kitchen gadget.
- Remind students to identify how the new device relies on the same principles as the simple and complex machines they have studied. Students could identify an improvement in the machine over previous versions.
- Students should consider the implications of the new device for individuals, society, and the environment.
- If you plan to observe with a core competency focus, consider using **Documenting Communication: Profiles** (or **Facets**) to record observational notes.

Communication
Assessment Tool

STUDENT RESOURCE PAGES 48–49

- Students can decide how to share and present their findings. They may wish to invite other students, family members, or community members to their presentations.

Formative Assessment

Collecting Information	Using Information
Observe the extent to which students are able to acquire, interpret, and present information about a new machine's innovations.	Consider providing descriptive feedback using the language of the **Communication Competency Profiles**. For example, *You gather basic information you need for a task, and present it in ways you have learned. You communicate clearly, in an organized way. You acquire the information you need for a task, and present it clearly.*

Communication

- Some students may wish to document this activity as an example of their **Communication** competency in Science, and complete a self-assessment using **Self-Assessment: Communication: Facets** (or **Prompts**).

Communication

Assessment Tool

Notes

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Notes

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Teacher's Resource	9780176799786
Student Resource (15-Pack)	9780176799861
Online Student Centre (15-Pack)	9780176820060
Physics and Earth/Space Science	
Classroom Set (Includes 25 copies of the Student Resource and 1 copy of the Teacher's Resource)	9780176799977
Teacher's Resource	9780176799793
Student Resource (15-Pack)	9780176799878
Online Student Centre (15-Pack)	9780176820077
Grade 7	
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