Ontario

hands-on science and Technology

An Inquiry Approach With STEM Skills and Connections

Grade 5

Series Author
Jennifer E. Lawson

Indigenous Consultant
Jennifer Manitowabi

Coding and STEM Contributor
Kellie Ierullo



PORTAGE & MAIN PRESS

Winnipeg • Manitoba • Canada

© 2025 Jennifer E. Lawson

Pages of this publication designated as reproducible with the following icon may be reproduced under licence from the Canadian Copyright Licensing Agency, Access Copyright. All other pages may only be reproduced with the prior written permission of Portage & Main Press Limited, or as permitted by law.

All rights are reserved. This publication may not, in whole or in part, be reproduced, stored in a retrieval system, transmitted in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise—or used to train any artificial intelligence device or software or otherwise incorporated or inputted in any artificial intelligence device or software.

Portage & Main Press gratefully acknowledges the financial support of the Government of Canada as well as the Province of Manitoba through the Department of Sport, Culture, Heritage and Tourism and the Manitoba Book Publishing Tax Credit for our publishing activities.

Funded by the Government of Canada
Financé par le gouvernement du Canada

Canada

Hands-On Science and Technology for Ontario
Hands-On Science and Technology for Ontario, Grade 5
An Inquiry Approach With STEM Skills and Connections

ISBN: 978 1 77492 0701
Printed and bound in Canada by Rapido Books

1 2 3 4 5 6 7 8 9 10

Download the digital resources (image banks and reproducibles) that accompany this book by going to the Portage & Main Press website at **<https://www.portageandmainpress.com/isbn/9781774920701>**. Use the password XXXXXXX to access this free download. For step-by-step instructions to access the digital resources, see the Appendix on page 267.

The publisher has made every effort to acknowledge all sources of photographs used in the image banks. The publisher would be grateful if any errors or omissions were pointed out, so that they may be corrected.

Contributors:

Kellie Ierullo

Book and Cover Design:
Relish New Brand Experience Inc.

Cover Photo:
FatCamera/E+ via Getty Images

Illustrations:
ArtPlus Ltd.
26 Projects
Susan Kao



PORTAGE & MAIN PRESS

www.portageandmainpress.com
Winnipeg, Manitoba
Treaty 1 Territory and homeland of the Métis Nation

Contents

Introduction to *Hands-On Science and Technology* 1

About *Hands-On Science and Technology* 2
The Goals of the Science and Technology Program 2
Hands-On Science and Technology Strands and Expectations 2
Hands-On Science and Technology Principles 2
The Importance of STEM Education 3
What Does STEM Look Like in a Classroom Setting? 4
What Is Coding? 4
Unplugged Coding Kits 6
The Inquiry Approach to Science and Technology 7
Cultural Connections 8
Indigenous Perspectives and Knowledge 8
References 11
Coding Reproducibles 13

How to Use *Hands-On Science and Technology* in Your Classroom 15

Unit Overview 15
Talking Circles 19
STEM Makerspaces 19
Classroom Environment 20
Planning Units 20
Timelines 20
Classroom Management 21
Classroom Safety 21
Land-Based Learning 21
References 22

Scientific and Engineering Design Processes 23

Scientific Inquiry Skills: Guidelines for Teachers 23
Observing 23
Questioning 23
Exploring 23
Classifying 23
Measuring 24
Communicating, Analyzing, and Interpreting 24
Predicting 27
Inferring 27
Inquiry Through Investigation and Experimentation 27
Engineering Design Process 28
Inquiry Through Research 28
Online Considerations 29
Addressing Students' Literacy Needs 29
References 29

The *Hands-On Science and Technology* Assessment Plan 30

Assessment *for* Learning 31
Assessment *as* Learning 31
Assessment *of* Learning 32
Performance Assessment 32
Portfolios 33
Indigenous Perspectives on Assessment 33
Evidence of Student Achievement Levels for Evaluation 34
Important Note to Teachers 34
References 34
Assessment Templates 35
Achievement Chart for Science and Technology 39

Unit 1: Human Organ Systems 43

About This Unit 44
Curriculum Correlation Chart 47
Resources for Students 48
1 What Do We Know About Keeping Our Bodies Healthy? 53
2 Why Does What We Eat Matter? 58
3 What Happens to Food After We Eat It? 66
4 Why Is Water Important for a Healthy Body? 73
5 Why Is Healthy Blood Red? 80
6 How Does Exercise Affect Your Heart and Lungs? 85
7 How Do Healthy Joints, Bones, and Muscles Help You Move? 91
8 How Does the Brain Send Messages to the Rest of the Body? 96
9 How Does Skin Protect Our Bodies? 101
10 How Do Our Bodies Fight Illness and Injury? 105

Unit 2: Properties of and Changes in Matter 111

About This Unit 112
Curriculum Correlation Chart 115
Resources for Students 116
1 What Do We Know About the Properties of Matter? 120
2 What Are Some Properties of Solids, Liquids, and Gases? 126
3 How Do Substances Interact and Change States? 132
4 How Do Substances Interact to Produce Gases? 140
5 How Can We Measure and Compare the Mass of Objects? 144
6 What Is a Physical Change? 149
7 How Can We Identify a Chemical Change? 153
8 How Does Food Preparation Depend on Physical and Chemical Changes? 158
9 How Can We Practise Safety With Household Chemicals? 164
10 How Can We Evaluate and Create Manufactured Products? 168

Unit 3: Forces Acting on Structures 175

About This Unit 176
Curriculum Correlation Chart 179
Resources for Students 180
1 What Is a Structure? 183
2 What Do We Know About Forces and Structures? 187
3 How Do Bridges Withstand Forces? 191
4 How Can We Design and Construct Bridges That Withstand Forces? 195
5 What More Can We Learn About Internal and External Forces? 199
6 How Do Forces of Nature Affect the Environment? 201
7 How Can We Protect Ourselves From Forces in Our Environment? 207
8 How Can We Design a Structure to Withstand Forces in the Environment? 211

Unit 4: Conservation of Energy and Resources 215

About This Unit 216
Curriculum Correlation Chart 220
Resources for Students 221
1 What Do We Know About Energy? 225
2 What Can We Learn About Different Forms of Energy? 230
3 How Is Energy Transformed? 236
4 What Are Fossil Fuels? 240

5 What Are Renewable Energy Resources? 245
6 What Is Solar Power? 250
7 What Is Water Power? 253
8 How Can We Conserve Energy? 257
9 Why Is It Important to Recycle? 262

Appendix: Image Banks 267

About the Contributors 288

Introduction to *Hands-On Science and Technology for Ontario, Grade 5*

Introduction to *Hands-On Science and Technology*

About *Hands-On Science and Technology*

Hands-On Science and Technology helps develop students' understanding of science and technology concepts and science, technology, engineering, and mathematics (STEM) skills. It also promotes scientific literacy through active inquiry, problem solving, and decision making. Each activity in ***Hands-On Science and Technology*** encourages students to explore, investigate, and ask questions as a means of heightening their curiosity about the world around them. Students solve problems through first-hand experiences and by observing and examining objects within their environment. For students to develop scientific and technological literacy, concrete experience is of the utmost importance—in fact, it is essential.

The Goals of the Science and Technology Program

Science and technology play fundamental roles in the lives of all Canadians. The Ontario science and technology curriculum identifies three main goals for students:

- to develop the skills and make the connections needed for scientific and technological investigation
- to relate science and technology to our changing world, including society, the economy, and the environment
- to explore and understand science and technology concepts

These goals are the foundation for the lessons in ***Hands-On Science and Technology***.

NOTE: *Hands-On Science and Technology* provides numerous opportunities for students to investigate issues related to sustainable development. Asking students the following question can often help to clarify for them what is meant by sustainability: "Is there enough for everyone, forever?" Exploring sustainability also connects to Indigenous worldviews about respecting and caring for the Earth. The three pillars of sustainability are the environment, society, and the economy.

Hands-On Science and Technology Strands and Expectations

The Ontario science and technology curriculum for all grade levels is organized into five strands:

A. STEM Skills and Connections
B. Life Systems
C. Matter and Energy
D. Structures and Mechanisms
E. Earth and Space Systems

Two sets of expectations are listed for each grade in each strand: (1) overall expectations and (2) specific expectations.

The overall expectations describe, in general terms, the knowledge and skills students are expected to demonstrate by the end of each grade.

The specific expectations describe the expected knowledge and skills in greater detail.

The overall and specific expectations for each strand are presented in the Curriculum Correlation Chart in the introduction to each unit of ***Hands-On Science and Technology***. The chart also identifies the lessons within the unit that correspond to each specific expectation.

Hands-On Science and Technology Principles

Hands-On Science and Technology is grounded in a research-based approach that puts students at the centre of the teaching and learning process. The following principles reflect this approach:

- Effective science and technology education involves hands-on inquiry, problem solving, and decision making.

▶

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

- The development of students' understanding of science and technology concepts and science, technology, engineering, and mathematics (STEM) skills forms the foundation of science and technology education.
- Children have a natural curiosity about science and the world around them. This curiosity must be maintained, fostered, and enhanced through active learning.
- Science and technology activities must be meaningful and worthwhile and relate to real-life experiences.
- The teacher's role in science and technology education is to facilitate activities and encourage critical thinking and reflection. Children learn best by doing, rather than just listening. Instead of simply telling, the teacher should focus on formulating and asking questions, setting the conditions for students to ask their own questions, and helping students make sense of the events and phenomena they have experienced.
- Science and technology should be taught in conjunction with other school subjects. Themes and topics of study should integrate ideas and skills from several core areas whenever possible.
- Science and technology education should encompass, and draw on, a wide range of educational resources, including literature, nonfiction research material, audio-visual resources, and technology, as well as people and places in the local community.
- Science and technology education should be infused with knowledge and perspectives of Indigenous Peoples, as well as other diverse multicultural perspectives.
- Assessment of student learning in science and technology should be designed to focus on performance and understanding and should be conducted through meaningful assessment techniques used throughout each unit. See the detailed overview of the ***Hands-On Science and Technology*** **Assessment Plan** on pages 30–34.
- Science and technology education is inclusive in nature. Learning opportunities should meet the diverse needs of all students through differentiated instruction and individualized learning experiences.

The Importance of STEM Education

The study of science, technology, engineering, and mathematics (STEM) helps students become scientifically and technologically literate citizens. STEM learning integrates and applies concepts and processes related to these subject areas through problem solving and design challenges. The skills that students develop through STEM learning include coding, innovation, computational thinking, and engineering and scientific design. STEM skills and concepts are infused throughout the units and lessons included in ***Hands-On Science and Technology***. Most lessons offer a suggestion for a STEM Makerspace project, which is designed to develop students' STEM skills in direct relation to the lesson. (See page 19 for a detailed overview of STEM Makerspaces.)

In addition, most lessons include coding activities. (See page 4 for more detailed information on coding.) ***Hands-On Science and Technology*** emphasizes the creative coding approach, which focuses on the key skills of creativity, agency, and computing, described in the Harvard Graduate School of Education's *Creative Computing Curriculum* as follows:

Creativity: Computer science and computing-related fields are often introduced to young people in a way that is disconnected from their interests and values—emphasizing technical detail over creative potential. Creative computing supports the development of personal

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

connections to computing by drawing upon creativity, imagination, and interests.

Agency: Many young people with access to computers participate as consumers, rather than designers or creators. Creative computing emphasizes the knowledge, practices, and fundamental literacies that young people need to create the types of dynamic and interactive computational media they enjoy in their daily lives.

Computing: Creating computational artifacts prepares young people for more than careers as computer scientists or programmers. It supports young people's development as computational thinkers—individuals who can draw on computational concepts, practices, and perspectives in all aspects of their lives, across disciplines and contexts.

What Does STEM Look Like in a Classroom Setting?

When students engage in STEM learning they actively work in teams, collaborating to find solutions to real-world problems using science, technology, engineering, and mathematics. They use a variety of materials and technologies to innovate and create. They draw plans, gather materials, build prototypes, and test what they have built. They conduct experiments, take measurements, and record their observations. Students use digital technology to create new content such as photos, videos, digital presentations, animations, and games. They engage in programming activities using coding and robotics. Students reflect on their work and understand that there are many possible solutions to a problem. STEM in the classroom is student centred, with the teacher acting as facilitator of the learning. The classroom is humming with excitement as students discuss their ideas and share their work.

What Is Coding?

Coding, also called computer programming, refers to giving a computer a set of specific step-by-step instructions that tell it what to do. These instructions need to be written in a language the computer understands, referred to as a *programming language*. There are many programming languages. They use letters, numbers, and symbols in their instructions. Children first learn to code with easy-to-learn, user-friendly languages that use visual symbols like blocks. Scratch is an example of a programming language made for young people. Familiarize yourself with some coding resources that can be used in the classroom, such as Scratch <https://scratch.mit.edu/>, a free block-based programming language designed for student use, and Code.org, a website that offers free coding courses and activities.

No previous coding experience is necessary to engage students in the Coding Connections activities provided throughout ***Hands-On Science and Technology, Grade 5***. Use the suggested coding activities as an opportunity to learn alongside students. Making mistakes and using logical reasoning to fix them (*debugging*) are key parts of learning to code. Provide students with plenty of free exploration time when introducing a new program, so they can discover its features before working on a specific task.

The key ideas and coding concepts for students to learn in grade 5 are as follows:

- Computer code is written in a specific order (called a *sequence* or *algorithm*), so the computer knows which step to complete first, next, and so on.
- Code can be written and executed so that multiple things happen at the same time (referred to as *concurrent events*).

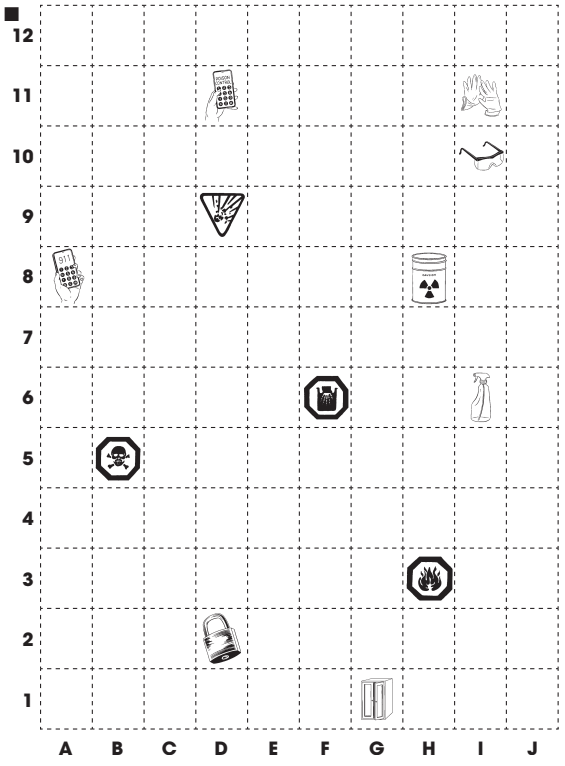
Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

- Code can be written and executed so instructions can be repeated over and over again (referred to as *repeating events* or *loops*).
- Code can be written and executed so that control structures (such as loops) can be placed inside other control structures (referred to as *nested events*).
- Code can be written and executed to include control structures that can be evaluated to make decisions based on whether a condition is true or false (referred to as *conditional statements*).
- Code can be written more *efficiently* (using the fewest instructions possible).
- Making mistakes and figuring out how to fix them (*debugging*) is an important part of learning to code.
- Existing code can be altered to change the outcomes (referred to as *remixing code*).
- Code can be written and executed to model concepts by producing a variety of different outputs (what the program produces, such as sounds, lights, images, motion, and text).
- Code can be written and executed to store and process data for a variety of purposes.
- *Pseudocode* is an informal way of expressing a program (a set of instructions for the computer) without having to follow any rules, and may include a combination of words, numbers, and symbols.

Coding concepts can be taught to students with or without the use of digital technology. ***Hands-On Science and Technology*** includes coding activities for both *plugged* and *unplugged* learning environments.

- *Plugged coding* uses the programming languages that a computer understands, therefore requiring the use of digital technology. A typical plugged coding activity for grade 5 is to connect a series of code blocks together, including conditional statements, to model scientific concepts in Scratch. For example, Scratch can be used to write a program that models how the human digestive system works.
- *Unplugged coding* introduces coding and programming through hands-on activities and games. A typical unplugged coding activity for grade 5 is to provide students with a labelled grid (letters along the x-axis and numbers along the y-axis), loose parts, a set of coding cards with directional arrows (including turns and loops), and If/Then/Else cards. Students use the cards to write a program that models real-world concepts. For example, students might create a game where the object is to navigate the grid while evaluating the safety of different situations involving household chemicals. Students can use the If/Then/Else cards and the boolean expressions provided in specific lessons to determine an outcome depending upon whether the boolean is true or false. For example, IF poison is ingested, THEN call poison control, ELSE lock poison in cabinet for safety. A labelled grid and a set of coding cards are provided on page 13. Print the labelled grid and the coding cards on 11 x 17 paper. A set of If/Then/Else cards are provided on page 14.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1



If

Poison is ingested

Then

call poison control

Else

lock cabinet

Students can also describe their program using pseudocode, an informal way of expressing the steps in their program (a set of instructions for the computer) without having to follow any rules. Pseudocode is different from programming languages, which have very specific rules and formatting. Although there are no rules when writing pseudocode, computer programmers often follow some conventions when creating it. For students learning to express their own programs using pseudocode, the most important thing to note is that it should be easily understood by other people. For students in grade 5, pseudocode may include a combination of words, numbers, and symbols.

The following resources can be used to help introduce coding into your classroom:

- Canada Learning Code: <http://www.canadalearningcode.ca/>
- Code.org: <https://code.org/>
- Hello Ruby for educators: Love Letters for Computers: <https://www.helloruby.com/loveletters>

NOTE: Check with your board or school to learn which coding apps are available to you and are recommended for use in your classroom.

Unplugged Coding Kits

Prepare unplugged coding kits for students to use with the Coding Connections activities throughout ***Hands-On Science and Technology, Grade 5***. Unplugged coding kits are easy to make using common classroom materials. Include some of the following items in your kits:

- **Loose Parts:** In unplugged coding, students use loose parts as obstacles or goals. Consider including items such as coloured tiles or chips, two-sided counters,

▶

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

multicoloured linking cubes or centimetre cubes, LEGO pieces, game pawns and pieces, small toys, stickers, natural materials (e.g., pebbles, polished stones, shells, pinecones, woodchips), printable images related to the unit's theme, paper, pencils, crayons, markers, and scissors (so students can draw and cut out their own images). Be creative and use what is available.

Printable Image Cards are included with lessons as needed. Students can also draw additional images on the Blank Cards (see page 13). Print Blank Cards on 11 x 17 paper.

- **Grids:** Students use grids to design challenges and execute code. In the unplugged coding kits, consider including chart paper with gridlines, printable grids of various sizes, game boards with squares (e.g., checkers, chess), and hundreds charts. Create larger grids on tabletops or floors using masking tape. To create a foldable grid, paint or tape a grid onto a blanket, sheet, tablecloth, or drop cloth. Use sidewalk chalk or paint to create grids in outdoor learning spaces.

  A Labelled Grid template is included (see page 13). Print the Labelled Grid template on 11 x 17 paper.

NOTE: The labelled grid uses letters (x-axis) and numbers (y-axis) to refer to specific locations on the grid. Students may initially need support to understand how the labels on the grid (e.g., A1) relate to locations on the grid. With practice, students will begin to understand how the labels make it easier to describe a location.

- **Coding Cards:** Students use coding cards to create algorithms (sequences of actions) that direct the movements of objects or people along the grid. Print the provided Coding Cards (see page 13) on 11 x 17 paper. Students can also draw their own coding cards. Ensure student cards include directional arrows (left, right, up, down), arrows with elbows for right turns and left turns, and stop and go cards (e.g., a red stop sign, a green go sign). As students become more familiar with coding, allow them to add cards to the deck. Ask them to explain their reasons for including the new cards. To help students organize their coding cards when initially creating sequences, provide 5 frames or 10 frames to use as a graphic organizer.

The Inquiry Approach to Science and Technology

As students explore science and technology concepts, they are encouraged to ask questions to guide their own learning. The inquiry approach is based on five components:

1. formulating questions
2. gathering and organizing information, evidence, or data
3. interpreting and analyzing information, evidence, or data
4. evaluating information, evidence, or data, and drawing conclusions
5. communicating findings

Using this approach, teachers facilitate the learning process. Students initiate questions; gather, organize, interpret, and analyze information; evaluate findings and draw conclusions; and communicate their learning. The process focuses on students' self-reflections as they ask questions, discover answers, and communicate their understanding.

An inquiry approach begins with more structured inquiry, moves to guided inquiry, and, finally, leads to open inquiry:

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Structured Inquiry	■ The teacher provides the initial question and structures the procedures to answer it. ■ Students follow the procedures and draw conclusions to answer the question.
Guided Inquiry	■ The teacher provides the initial question. ■ Students are involved in designing ways to answer the question and communicate their findings.
Open Inquiry	■ Students formulate their own question(s), design and follow through with a developed procedure, and communicate their findings and results.

NOTE: According to Banchi and Bell (2008), open inquiry "requires the most scientific reasoning and greatest cognitive demand from students. … It is only appropriate to have students conducting open inquiries" when they have developed the necessary skills through "ample experience at the first three levels of inquiry" (p. 27). This requires careful observation and assessment by teachers to ensure that students are ready for open inquiry.

In an inquiry approach to science and technology, questions and ideas form the foundation of the teaching and learning process. The following quotation, included in the Ontario Literacy and Numeracy Secretariat's overview of inquiry-based learning, speaks clearly to this approach:

> While all students ask questions and express interests in world phenomena, it takes creative and responsive teaching to transform wonder into knowledge. To begin, inquiry works best in a classroom in which ideas are placed at the centre. Establishing a culture in which students are encouraged to express ideas but also to respectfully challenge and test one another's ideas is an important first step in the inquiry process. This spirit of inquiry is achieved by welcoming ideas and trusting that even the simplest questions can lead to something greater and not yet evident. Like any good growing system, these questions need time to germinate. Students' ideas can be expressed in many forms (questions, comments, diagrams, pictures, dance, etc.) and serve the important purpose of advancing student understanding of a topic. When the classroom culture is one that views ideas as improvable, students work hard to continuously improve the quality, coherence and utility of ideas—both individually and collectively. (Scardamalia, 2002, quoted in Ontario Literacy and Numeracy Secretariat, 2013, p. 4)

Cultural Connections

To acknowledge and celebrate the cultural diversity represented in Canadian schools, it is important to infuse cultural connections into classroom learning experiences. It is essential for teachers to be aware of the cultural makeup of their class and to celebrate students' diverse cultures by making connections to curricular expectations. It is also important to explore other cultures represented in the community and beyond to encourage intercultural understanding and harmony.

Throughout ***Hands-On Science and Technology***, suggestions are made for connecting science and technology topics to cultural explorations and activities.

Indigenous Perspectives and Knowledge

Indigenous Peoples are central to the Canadian context, and it is important to infuse Indigenous knowledge into the learning experiences of all students. The worldviews of Indigenous Peoples and their approaches and contributions to science are now being acknowledged and incorporated into science and technology education. The intentional integration of Indigenous knowledge in ***Hands-On Science and Technology*** helps to address the Calls to Action of the Truth and Reconciliation Commission of Canada (2015), particularly the calls to "integrate Indigenous knowledge and

▶

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

teaching methods into classrooms" (Action 62) and "build student capacity for intercultural understanding, empathy and mutual respect" (Action 63).

NOTE: The book *Braiding Sweetgrass for Young Adults: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants* by Indigenous scientist Robin Wall Kimmerer (Zest Books, 2022) is an excellent resource for teachers and students. It focuses on how all living things provide us with gifts and lessons.

The traditional territories of Indigenous Peoples cover the entirety of what is now known as Ontario. It is important to recognize the diversity of Indigenous Peoples in Ontario and to focus on both the traditions and contemporary lives of the Indigenous communities in your area. Contact personnel in your school board—Indigenous education leads and consultants and Indigenous Education Councils—to find out what resources (e.g., people, books, videos) are available. Many such resources are featured in ***Hands-On Science and Technology***.

Indigenous Peoples have depended on and shared reciprocal relationships with the land since time immemorial. The environment—including geography, land and waters, vegetation, and climate—shapes their way of life. Since they observe the land and its inhabitants, the environment teaches Indigenous Peoples to survive and determines the methods they use to do so. The land continues to shape Indigenous Peoples' way of life today because of their ongoing, deep connection to it. Cultural practices, stories, languages, and knowledge originate from the land and water.

NOTE: When implementing land-based learning, opportunities abound to consider Indigenous knowledge and perspectives. (See page 21 for more information about land-based learning.) Outdoor learning provides an excellent opportunity to identify the importance of place. For example, use a map of the local area to have students identify the location of the land-based learning activity in relation to the school. This will help students develop a stronger image of their community and surrounding area.

It is also important to identify on whose traditional territory the school is located and where any land-based learning occurs, as well as the traditional names for these locations. The following sites provide maps of Ontario's First Nations that can be used for this purpose:

- Ontario First Nations Maps: <https://www.ontario.ca/page/ontario-first-nations-maps>
- Maps of Indigenous Communities in Ontario: <https://www.sac-isc.gc.ca/eng/1635957754306/1635957787562>
- First Nation Profiles Interactive Map: <https://geo.sac-isc.gc.ca/cippn-fnpim/index-eng.html>

In addition, the educator's guide *The First Nations and Treaties Map of Ontario as an Instructional Resource* offers maps and information for teachers; it is available at <http://www.edu.gov.on.ca/eng/indigenous/the-first-nations-and-treaties-map-of-ontario.pdf>.

Incorporate a land acknowledgment once students have learned whose territory the school and land-based learning location is on. The following example can be used for guidance:

- <location of school, e.g., city or town> *is located on the traditional territory of the _____ and is within the boundaries set by the_____ treaty_____.*

NOTE: Many Ontario school boards have established protocols for land acknowledgments. Check with Indigenous education leads and consultants in your board to see if there are specific protocols to follow.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

When incorporating Indigenous perspectives in the classroom, it is important to value Traditional Ecological Knowledge:

> Traditional Ecological Knowledge, or TEK, is the most popular term to denote the vast local knowledge First Peoples have about the natural world found in their traditional environment. […] TEK is, above all, local knowledge based in people's relationship to place. It is also holistic, not subject to the segmentation of Western science. Knowledge about a specific plant may include understanding its life cycle, its spiritual connections, its relationship to the seasons and with other plants and animals in its ecosystem, as well as its uses and its stories. (First Nations Education Steering Committee and First Nations Schools Association, 2019, p. 13)

Indigenous Peoples developed technologies and survived on this land for millennia because of their knowledge of and reciprocal relationships with the land. Indigenous Peoples used observation and experimentation to refine technologies, such as building canoes and longhouses and discovering food-preservation techniques. Accordingly, TEK serves as an invaluable resource for science students and teachers.

Indigenous Peoples do not view their knowledges as "science," as is reflected in this quote from the president of the Science Museum of Minnesota, Dr. Eric J. Jolly (Cherokee):

> When I weave a basket, I talk about the different dyes and how you make them and how the Oklahoma clay that we put on our baskets doesn't permeate the cell walls, it deposits on the outside. It makes a very nice dye but if you cut through the reed you'll see white still on the inside of the reed, whereas if I make a walnut dye and if I use as my mordent, alum and I use as my acid cider, that walnut dye will permeate the cell walls. You cut through the reed and it's brown through and through. Now what I've just described is the difference between osmosis and dialysis. That Western science calls those scientific terms is really wonderful, but it's not scientific terms if you are a basket weaver. Our culture incorporates so much of what people would call scientific knowledge and ways of thinking so naturally that we haven't parsed it out and put it in a book and said this is our science knowledge versus our weaver's knowledge. When I weave a basket I also tell the stories of the spirituality and not just the ways of which I dyed it. A basket weaver is as much a scientist, as an artist, and a spiritual teacher. We'd never think that you'd separate out just the science part, but you can't weave a basket without knowing the science. (Cited in Mack et al., 2012, pp. 50–51)

Throughout ***Hands-On Science and Technology***, there are many opportunities to incorporate culturally appropriate teaching methodologies from an Indigenous worldview. Making connections to the local community is essential to learning about Indigenous knowledge and ways of knowing. As one example, Elders and Knowledge Keepers offer a wealth of knowledge that can be shared with students. Consider inviting a local Elder or Knowledge Keeper as a guest into the classroom in connection with specific topics being studied (as identified within the given lessons throughout the unit). An Elder or Knowledge Keeper can guide a nature walk, share stories and experiences, describe traditional technologies, and help students understand Indigenous Peoples' perspectives of the natural world. Elders and Knowledge Keepers will provide guidance for learners and opportunities to build bridges between the school and the community.

NOTE: In ***Hands-On Science and Technology***, the term *Knowledge Keeper* refers to individuals who may or may not be recognized as Elders, but who carry the teachings of their community and can be called upon for that expertise. The term *Knowledge Holder* is used interchangeably with *Knowledge Keeper* in some communities (Government of Ontario, 2020–2023).

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

It is especially important to connect with Indigenous communities, Elders, and Knowledge Keepers in your local area, and to study local issues related to Indigenous Peoples in Ontario. Consider contacting the Indigenous education lead or consultant in your school board, your local Indigenous Education Council, or the Ontario Ministry of Education to access referrals. You may also consider contacting local Indigenous organizations for referrals to Elders and Knowledge Keepers. Such organizations may also be able to offer resources and opportunities for field trips and land-based learning.

Here are a few suggestions for working with Elders and Knowledge Keepers:

- Elders and Knowledge Keepers have a deep spirituality that influences every aspect of their lives and teachings. They are recognized because they have earned the respect of their community through wisdom, harmony, and balance in their actions and teachings (see Indigenous Corporate Training, 2019).
- Some Indigenous keepers of knowledge are more comfortable being called "Knowledge Keepers" than "Elders." Be sensitive to their preference. In many communities, there are also "Junior Elders" who may also be invited to share their knowledge with students and school staff.
- Elders and Knowledge Keepers may wish to speak about what seems appropriate to them, instead of being directed to talk about something specific. It is important to respect this choice and not be directive about what an Elder or Knowledge Keeper will talk about during their visit.
- It is important to properly acknowledge any visiting Elders or Knowledge Keepers and their knowledge, as they have traditionally been and are recognized within Indigenous communities as highly esteemed individuals.

NOTE: It is important to understand the significant contribution that Elders, Knowledge Keepers, and Indigenous communities make when they share their traditional knowledge. In their culture of reciprocity, this understanding should extend past giving a gift or honorarium to an Elder or Knowledge Keeper for sharing knowledge. Think deeply about reciprocity and how you can go beyond inviting Indigenous guests to your classroom. Expand your own learning and become connected to Indigenous people by, for example, engaging in Indigenous community events, working with the education department of the local Nations, or exploring ways to continue developing the relationship between the local Nations and teachers in your board.

NOTE: Indigenous resources recommended in ***Hands-On Science and Technology*** are considered to be authentic resources, meaning that they reference the Indigenous community they came from, they state the individual who shared the story and gave permission for the story to be used publicly, and the person who originally shared the story is Indigenous. Stories that are works of fiction were written by an Indigenous author; for stories with more than one author, at least one of the authors is Indigenous. For more information, see the First Nations Education Steering Committee's *Authentic First Peoples Resources* guides at <http://www.fnesc.ca/authenticresources/>.

References

Banchi, Heather, and Randi Bell. "The Many Levels of Inquiry." *Science and Children*, 46, no. 2 (2008): 26–29.

First Nations Education Steering Committee. *Authentic First Peoples Resources, K–9,* 2021, and *Authentic First Peoples Resources, For Grades 10–12 and Adult Learning*. http://www.fnesc.ca/authenticresources/.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

First Nations Education Steering Committee and First Nations Schools Association. *Secondary Science First Peoples Teacher Resource Guide*, 2019. http://www.fnesc.ca/wp/wp-content/uploads/2019/08/PUBLICATION-SCIENCE-FIRST-PEOPLES-Secondary-TRG-2019.pdf.

Government of Canada. "Maps of Indigenous Communities in Ontario." Indigenous Services Canada, Geomatics Services, 2020. https://www.sac-isc.gc.ca/eng/1635957754306/1635957787562.

Government of Canada. "First Nation Profiles Interactive Map." https://geo.sac-isc.gc.ca/cippn-fnpim/index-eng.html.

Government of Ontario. "Ontario First Nations Maps." https://www.ontario.ca/page/ontario-first-nations-maps.

Government of Ontario. *The First Nations and Treaties Map of Ontario as an Instructional Resource: An Educator's Guide*, 2020. http://www.edu.gov.on.ca/eng/indigenous/the-first-nations-and-treaties-map-of-ontario.pdf.

Harvard Graduate School of Education. *Creative Computing Curriculum*. http://scratched.gse.harvard.edu/guide/index.html.

Indigenous Corporate Training. "Indigenous Elder Definition." *Working Effectively With Indigenous Peoples* (blog), Dec. 7, 2019. https://www.ictinc.ca/blog/aboriginal-elder-definition.

Mack, Elizabeth, et al. "Effective Practices for Creating Transformative Informal Science Education Programs Grounded in Native Ways of Knowing." *Cultural Studies of Science Education*, 7 (2012): pp. 49–70. https://doi.org/10.1007/s11422-011-9374-y.

Ontario Literacy and Numeracy Secretariat. *Inquiry-Based Learning*. Capacity Building Series 32, 2013. https://www.onted.ca/monographs/capacity-building-series/inquiry-based-learning.

Ontario Ministry of Education. *The Ontario Curriculum, Grades 1–8: Science and Technology*, 2022. https://www.dcp.edu.gov.on.ca/en/curriculum/science-technology.

Scardamalia, Marlene. "Collective Cognitive Responsibility for the Advancement of Knowledge." In *Liberal Education in a Knowledge Society*, edited by Barry Smith, 67–98. Chicago: Open Court, 2002.

Truth and Reconciliation Commission of Canada. *Truth and Reconciliation Commission of Canada: Calls to Action*. Winnipeg: University of Manitoba, 2015.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

How to Use *Hands-On Science and Technology* in Your Classroom

Unit Overview

Hands-On Science and Technology for Ontario is organized in a format that makes it easy to plan and implement. The book opens with an introduction (which includes assessment reproducibles) and is divided into four units that cover the selected topics of study for the grade level:

- Life Systems: Human Organ Systems
- Matter and Energy: Properties of and Changes in Matter
- Structures and Mechanisms: Forces Acting on Structures
- Earth and Space Systems: Conservation of Energy and Resources

The units relate directly to the strands, expectations, fundamental concepts, and big ideas outlined in *The Ontario Curriculum, Grades 1–8: Science and Technology* (2022) document. Each unit opens with About This Unit, an introduction to the unit that summarizes the general goals for the unit. It provides background information for teachers, planning tips, and lists of vocabulary related to the unit, as well as other pertinent information such as how to embed Indigenous perspectives into student learning.

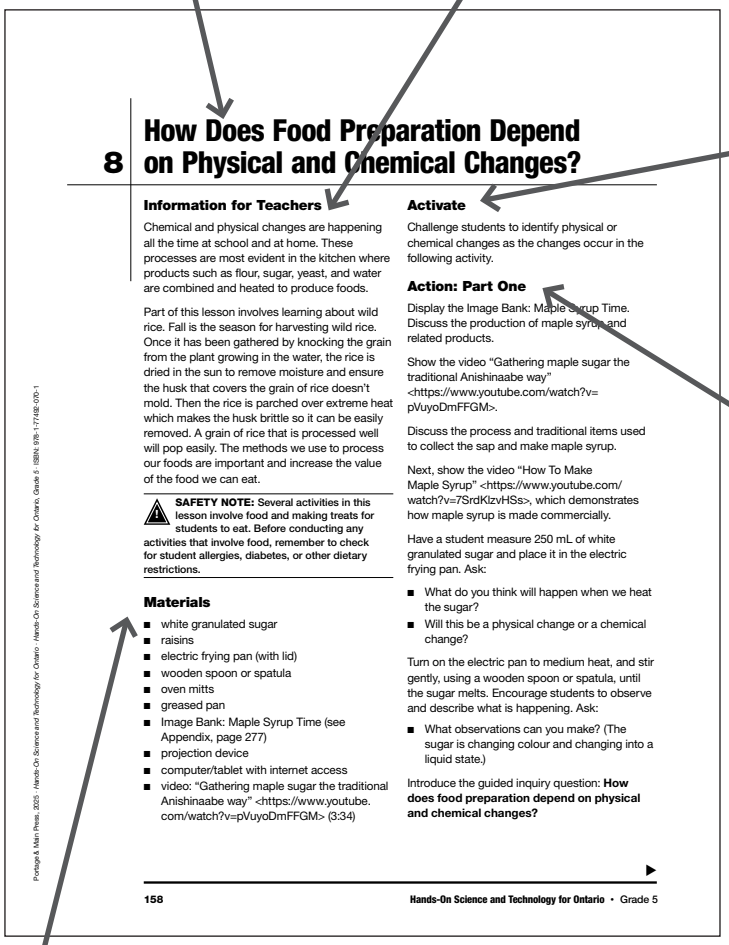
Additionally, About This Unit includes lists of related resources (books and online videos), annotated websites suitable for students, and coding and STEM resources.

Each unit is organized into numbered lessons composed of topics and activities based on the overall and specific expectations. Lessons are arranged in the following format:

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Lesson Title
- posed as a guided inquiry question related to the expectations addressed in the lesson

Information for Teachers
- provides basic scientific and technological knowledge needed for the activities



8 How Does Food Preparation Depend on Physical and Chemical Changes?

Information for Teachers

Chemical and physical changes are happening all the time at school and at home. These processes are most evident in the kitchen where products such as flour, sugar, yeast, and water are combined and heated to produce foods.

Part of this lesson involves learning about wild rice. Fall is the season for harvesting wild rice. Once it has been gathered by knocking the grain from the plant growing in the water, the rice is dried in the sun to remove moisture and ensure the husk that covers the grain of rice doesn't mold. Then the rice is parched over extreme heat which makes the husk brittle so it can be easily removed. A grain of rice that is processed well will pop easily. The methods we use to process our foods are important and increase the value of the food we can eat.

SAFETY NOTE: Several activities in this lesson involve food and making treats for students to eat. Before conducting any activities that involve food, remember to check for student allergies, diabetes, or other dietary restrictions.

Materials
- white granulated sugar
- raisins
- electric frying pan (with lid)
- wooden spoon or spatula
- oven mitts
- greased pan
- Image Bank: Maple Syrup Time (see Appendix, page 277)
- projection device
- computer/tablet with internet access
- video: "Gathering maple sugar the traditional Anishinaabe way" <https://www.youtube.com/watch?v=pVuyoDmFFGM> (3:34)

Activate

Challenge students to identify physical or chemical changes as the changes occur in the following activity.

Action: Part One

Display the Image Bank: Maple Syrup Time. Discuss the production of maple syrup and related products.

Show the video "Gathering maple sugar the traditional Anishinaabe way" <https://www.youtube.com/watch?v=pVuyoDmFFGM>.

Discuss the process and traditional items used to collect the sap and make maple syrup.

Next, show the video "How To Make Maple Syrup" <https://www.youtube.com/watch?v=7SrdKlzvHSs>, which demonstrates how maple syrup is made commercially.

Have a student measure 250 mL of white granulated sugar and place it in the electric frying pan. Ask:
- What do you think will happen when we heat the sugar?
- Will this be a physical change or a chemical change?

Turn on the electric pan to medium heat, and stir gently, using a wooden spoon or spatula, until the sugar melts. Encourage students to observe and describe what is happening. Ask:
- What observations can you make? (The sugar is changing colour and changing into a liquid state.)

Introduce the guided inquiry question: **How does food preparation depend on physical and chemical changes?**

158 Hands-On Science and Technology for Ontario • Grade 5

Portage & Main Press, 2025 · Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5 · ISBN: 978-1-77492-070-1

Activate
- activates prior knowledge, piques students' curiosity about related concepts, and introduces the lesson's guided inquiry question
- teachers may choose to record the guided inquiry question for display (e.g., on a sentence strip) so students can refer to it during activities and discussion

Action
- details a step-by-step procedure, including higher-level questioning techniques, and suggestions for encouraging the development of new knowledge and skills
- identified as Action: Part One, Action: Part Two, and so on (when there is more than one Action activity in a lesson)

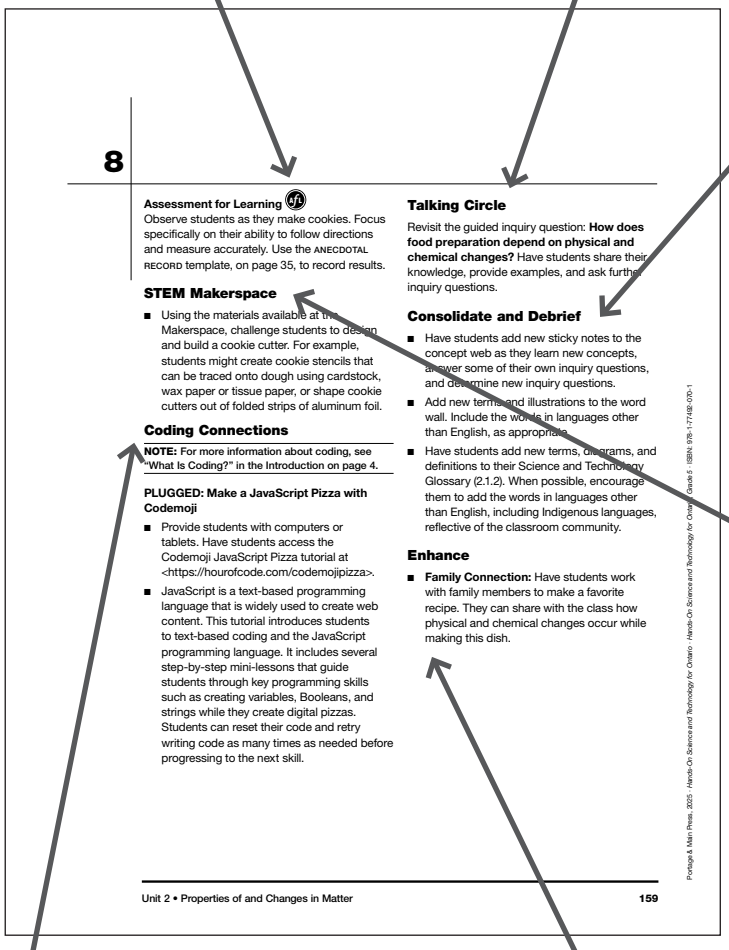
Materials
- lists all materials required to conduct the main activities
- includes items for display purposes or for recording students' ideas
- suggests visual materials (e.g., large pictures, sample charts, diagrams) to assist in presenting ideas and questions and to encourage discussion
- connects to Image Bank visuals, which may be printed or projected for specific activities (see Appendix on page 267 for thumbnails and free access)

Portage & Main Press, 2025 · Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5 · ISBN: 978-1-77492-070-1

Assessment For, As, and Of Learning
- provides suggestions for authentic assessment, which includes assessment *for* learning, assessment *as* learning, and assessment *of* learning
- focuses on the specific expectations related to the particular lesson (assessment strategies are outlined in the ***Hands-On Science and Technology*** Assessment Plan on page 30)

Talking Circles
- provides students with opportunities to participate in a Talking Circle (see page 19 for more information) to demonstrate their learning through consolidation and to debrief on guided inquiry questions

Consolidate and Debrief
- suggests activities that review the main ideas of the lesson, focusing on fundamental concepts, big ideas, and overall and specific expectations
- offers ways for students to demonstrate what they have learned through consolidation and reflection, allowing for synthesis and application of inquiry and new ideas
- embeds learning by adding to graphic organizers; having students record, describe, and illustrate new vocabulary and communicate investigations and ideas in a science and technology glossary; and adding new science and technology vocabulary to the classroom word wall
- provides opportunities to reflect the cultural diversity of the classroom and the community by including new terminology in languages other than English, including Indigenous languages



8

Assessment for Learning
Observe students as they make cookies. Focus specifically on their ability to follow directions and measure accurately. Use the ANECDOTAL RECORD template, on page 35, to record results.

STEM Makerspace
- Using the materials available at the Makerspace, challenge students to design and build a cookie cutter. For example, students might create cookie stencils that can be traced onto dough using cardstock, wax paper or tissue paper, or shape cookie cutters out of folded strips of aluminum foil.

Coding Connections

NOTE: For more information about coding, see "What Is Coding?" in the Introduction on page 4.

PLUGGED: Make a JavaScript Pizza with Codemoji
- Provide students with computers or tablets. Have students access the Codemoji JavaScript Pizza tutorial at <https://hourofcode.com/codemojipizza>.
- JavaScript is a text-based programming language that is widely used to create web content. This tutorial introduces students to text-based coding and the JavaScript programming language. It includes several step-by-step mini-lessons that guide students through key programming skills such as creating variables, Booleans, and strings while they create digital pizzas. Students can reset their code and retry writing code as many times as needed before progressing to the next skill.

Talking Circle
Revisit the guided inquiry question: **How does food preparation depend on physical and chemical changes?** Have students share their knowledge, provide examples, and ask further inquiry questions.

Consolidate and Debrief
- Have students add new sticky notes to the concept web as they learn new concepts, answer some of their own inquiry questions, and determine new inquiry questions.
- Add new terms and illustrations to the word wall. Include the words in languages other than English, as appropriate.
- Have students add new terms, diagrams, and definitions to their Science and Technology Glossary (2.1.2). When possible, encourage them to add the words in languages other than English, including Indigenous languages, reflective of the classroom community.

Enhance
- **Family Connection:** Have students work with family members to make a favorite recipe. They can share with the class how physical and chemical changes occur while making this dish.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Unit 2 • Properties of and Changes in Matter 159

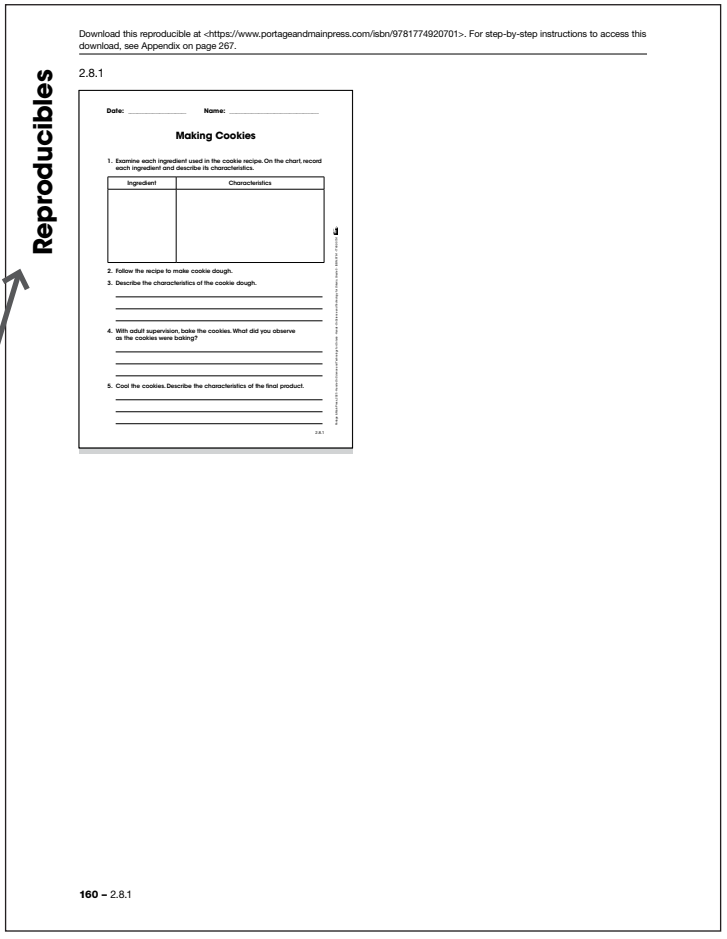
STEM Makerspace
- addresses STEM concepts and skills and promotes personalized learning, open inquiry, discovery, creation, and innovation related to the unit expectations
- suggests materials, equipment, and challenges related to the specific science and technology topics of study, while correlating with other subject areas

Coding Connections
- provides suggestions for plugged and unplugged coding activities; see page 5 for an explanation of plugged and unplugged coding

Enhance
- encourages active participation and learning through Family Connections, tasks that students complete at home with their family members, then bring back to school to share
- suggests additional optional activities to extend, enrich, and reinforce the expectations

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Reproducibles
- are included as thumbnails following the lesson
- may be used to guide activities or record data
- may also serve as a template for designing and constructing graphic organizers
- can be downloaded by going to the Portage & Main Press website at <https://www.portageandmainpress.com/isbn/9781774920701>. Use the password ENERGY5 for access.


Download this reproducible at <https://www.portageandmainpress.com/isbn/9781774920701>. For step-by-step instructions to access this download, see Appendix on page 267.

Reproducibles

2.8.1

Date: _____ Name: _____

Making Cookies

1. Examine each ingredient used in the cookie recipe. On the chart, record each ingredient and describe its characteristics.

Ingredient	Characteristics

2. Follow the recipe to make cookie dough.
3. Describe the characteristics of the cookie dough.

_____
_____
_____

4. With adult supervision, bake the cookies. What did you observe as the cookies were baking?

_____
_____
_____

5. Cool the cookies. Describe the characteristics of the final product.

_____
_____
_____

2.8.1

160 – 2.8.1

NOTE: Activity sheets are meant to be used only in conjunction with, or as a follow-up to, the hands-on activities. The activity sheets are not intended to be the science and technology lesson in itself or the sole assessment for the lesson.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Talking Circles

Each lesson encourages the class to participate in a Talking Circle to consolidate learning and debrief on guided inquiry questions. Talking Circles originated with First Nations leaders as a process to encourage dialogue, respect, and the co-construction of ideas. The following process is generally used in a Talking Circle:

- the group forms a complete circle
- one person holds an object such as a stick, feather, shell, or stone
- only the person holding the stick talks, while others listen
- the stick is passed around in a clockwise direction
- each person talks until they are finished, being respectful of time
- the Talking Circle is complete when everyone has had a chance to speak
- a person may pass the stick without speaking if they choose (for more information, see First Nations Pedagogy Online, "Talking Circles," at <www.firstnationspedagogy.ca/circletalks.html>)

Consider inviting a local Elder or Knowledge Keeper to share with the class the process of a Talking Circle.

STEM Makerspaces

To address STEM concepts and skills and promote personalized learning, each unit of ***Hands-On Science and Technology*** includes a variety of suggestions for STEM Makerspace materials, equipment, and challenges related to the specific science and technology topics of study, while correlating with other subject areas. Suggested materials and challenges are intended to support open inquiry, discovery, creation, and innovation related to the unit expectations.

A Makerspace is a creative do-it-yourself environment, where students pose questions, share ideas, and explore hands-on projects. In the school setting, a STEM Makerspace is usually cross-curricular and allows for inquiry, discovery, and innovation. Sometimes, the STEM Makerspace is housed in a common area, such as the library, which means it can be used by the whole school community. A classroom STEM Makerspace is usually designed as a centre where students use knowledge, concepts, and skills acquired in a particular lesson and apply them to STEM challenges. Students often create do-it-yourself projects, learning together and collaborating on cross-curricular ideas or classroom themes. It is important to remember that learning is not directed here. Rather, the goal is simply to create conditions for learning to happen and give students the opportunity to work with a variety of age-appropriate tools. The centre may evolve to foster inquiry within a specific topic.

There is no list of required equipment that defines a STEM Makerspace; however, there are some items that should be included such as paper, cardboard, everyday recycled materials, tape, and glue. You may wish to include reusable building materials such as interlocking plastic building blocks, snap cubes, pattern blocks, and straws and connectors. Additionally, arts-and-crafts materials such as construction paper, modelling clay, fabric, buttons, and pipe cleaners are often integrated into Makerspace offerings.

Consider the following when planning and developing a STEM Makerspace centre:

- Always address safety concerns, ensuring materials, equipment, and tools are safe for student use. Include safety gloves and goggles, as appropriate.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

- Consider space and storage needs. Mobile carts and/or bins are handy for storing raw materials and tools.
- Work with students to write a letter to parents/guardians to explain the purpose of the Makerspace and ask for donations of materials.

The following resources provide information about including STEM in the classroom:

- Ontario Science Centre STEM Education Toolkit: <https://www.ontariosciencecentre.ca/teachers-plus-students/teacher-resources/stem-education-toolkit>
- Ontario Council for Technology Education: <https://octe.ca/resources/elementary>
- Let's Talk Science: <https://letstalkscience.ca/>

Classroom Environment

The classroom setting is an important component of the learning process. An effective classroom environment is inclusive of the diverse backgrounds and learning needs of all students. The strengths students bring to school are identified and nurtured. At the same time, every student is supported so they can succeed. The classroom must also be a space that encourages inquiry and discussion. The following are suggestions that can be used to promote inquiry in the classroom:

- Encourage students to ask questions and to appreciate different perspectives.
- Foster a nonthreatening atmosphere in which all students are comfortable sharing.
- Provide lots of opportunities for students to reflect on questions, share ideas, and generate further questions for inquiry.
- Promote discussion with and between students, as they need to talk about ideas with each other and with the teacher to help make meaning.
- Model for students how to gather the information they need so they have an adequate foundation for discussion.
- Ensure questions are clear and vocabulary is appropriate to learners.
- Avoid dominating discussion.
- Provide equal opportunities for all learners to participate.
- Model good questions and questioning strategies.
- Guide students in discovering answers to questions.

An active environment—one that gently hums with students' purposeful conversations and activities—indicates that meaningful learning is taking place. When your class is studying a specific topic, display related objects and materials in the room, including student work; pictures and posters, maps, graphs, and charts made during activities; and anchor charts of important concepts, procedures, skills, or strategies that are co-constructed with students. Visuals serve as a source of information, reinforce concepts and skills that have been stressed during lesson activities, and support students who are visual learners. As a support throughout the unit, display charts outlining success criteria so that vocabulary and concepts are visible to students at all times.

Planning Units

Timelines

No two groups of students explore topics and materials at the same rate, and so planning the duration of lessons and units is an important responsibility of the teacher. In some cases, students will not complete a lesson's activities during one block of time. In addition, students may be especially interested in one topic and want to expand on it. Consider the individual needs of your class; there are no strict timelines for ***Hands-On Science and Technology***.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

It is important, however, to spend time on every unit in the book so that students focus on all the curriculum expectations established for this grade level.

Classroom Management

Hands-On Science and Technology provides students with many opportunities to participate in hands-on activities; they will benefit more from this type of primary experience than if you merely demonstrate the activities. Although hands-on activities are emphasized throughout this book, how these experiences are managed is up to the teacher, since it is you who ultimately determines how your students function best in the learning environment. In some cases, you may have all students manipulating materials individually; in others, you may choose to organize the class into small groups.

Organizing the class into small working groups of three or four students is the most productive and beneficial way to manage the activities. Group work encourages the development of social skills, enables all students to be active in the learning process, and can reduce the cost of materials and equipment. Students learn from their classmates while working in collaborative groups.

When your class is working in collaborative groups, it may be helpful to assign each student a role, as follows:

- **leader**: makes sure everyone in the group has an opportunity to share their ideas and opinions
- **recorder**: records the group's data, research, questions, and any other information on the lesson's sheets or charts
- **reporter**: reports the group's ideas, findings, or answers back to the class
- **materials manager**: collects and returns all materials needed for each activity

The quantity of materials required will depend on how you conduct activities. If students are working individually, you will need enough materials for each student. If students are working in groups, the materials required will be significantly reduced.

Classroom Safety

The nature of science and technology, and of scientific and technological experimentation, means that safety concerns do arise from time to time. In these instances, teachers may decide to demonstrate an activity themselves, while still encouraging as much student interaction as possible. Throughout ***Hands-On Science and Technology***, whenever there is a potential safety issue to be aware of, the following safety icon appears:



Land-Based Learning

Land-based learning replaces the classroom walls with the natural environment. Land-based learning offers all students first-hand opportunities to observe, explore, and investigate the land, waters, and atmosphere of the natural world. Land-based learning promotes a healthy interplay between society and nature and helps students envision a world where there is meaningful appreciation and respect for our natural environment—an environment that sustains all life forms. Many lessons in ***Hands-On Science and Technology*** incorporate land-based learning activities, ranging from a casual walk around the neighbourhood to examine trees to a more involved exploration of local waterways. When land-based learning connections are made in ***Hands-On Science and Technology***, the following icon appears:



Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

References

First Nations Pedagogy Online. "Talking Circles." www.firstnationspedagogy.ca/circletalks.html.

Ontario Ministry of Education. *The Ontario Curriculum, Grades 1–8: Science and Technology*, 2022. https://www.dcp.edu.gov.on.ca/en/curriculum/science-technology.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Scientific and Engineering Design Processes

Scientific Inquiry Skills: Guidelines for Teachers

Hands-On Science and Technology is based on a scientific inquiry approach. While involved in the lessons, students use a variety of inquiry skills as they answer questions, solve problems, and make decisions. These skills are not unique to science and technology, but are integral to students' acquisition of scientific and technological literacy. They include initiating and planning, performing and recording, analyzing and interpreting, and communicating and working in teams. At the grade 5 level, basic skills should focus on scientific inquiry and problem solving.

Use the following guidelines to encourage students' development of inquiry skills in specific areas.

Observing

Students learn to perceive characteristics and changes using all five senses. Encourage students to safely use sight, smell, touch, hearing, and taste to gain information about objects and events. Observations may be qualitative (e.g., texture, colour), quantitative (e.g., size, number), or both.

Observing includes:

- gaining information through the senses
- identifying similarities and differences, and making comparisons

Encourage students to communicate their observations in a variety of ways, including orally, in writing, by sketching labelled diagrams, and by capturing evidence digitally (e.g., using a camera or tablet).

Questioning

Generating thoughtful inquiry questions is an essential skill for students when participating in inquiry-based learning. Encourage students to be curious and to extend their questions beyond those posed to them.

Students should learn to formulate specific questions to investigate, then create, from a variety of possible methods, a plan to find answers to those questions.

Exploring

Students need ample opportunities to manipulate materials and equipment in order to discover and learn new ideas and concepts. During exploration, encourage students to use all of their senses and observation skills.

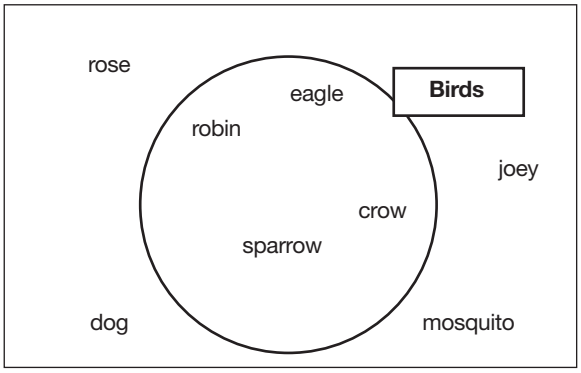
Oral discussion is also an integral component of exploration; it allows students to communicate their discoveries. At a deeper level, discussion allows students to make meaning by discussing inconsistencies/misconceptions and comparing/contrasting their observations with others. This is the constructivist model of learning, which is essential in inquiry-based learning.

Classifying

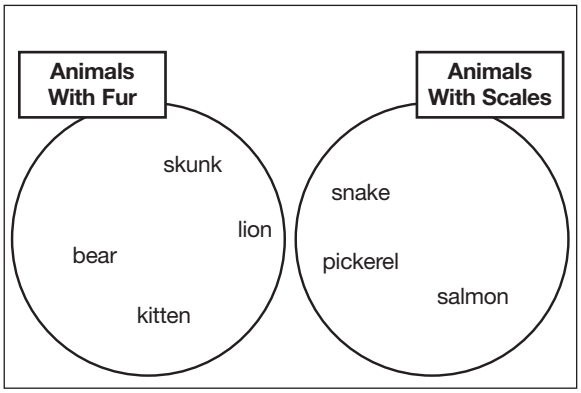
Classification is used to group or sort objects and events and is based on observable properties. For example, objects can be classified into groups according to colour, shape, or size. Two strategies for sorting are the use of sorting mats and Venn diagrams. Sorting mats show distinct groups, while Venn diagrams intersect to show similar characteristics among sets.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

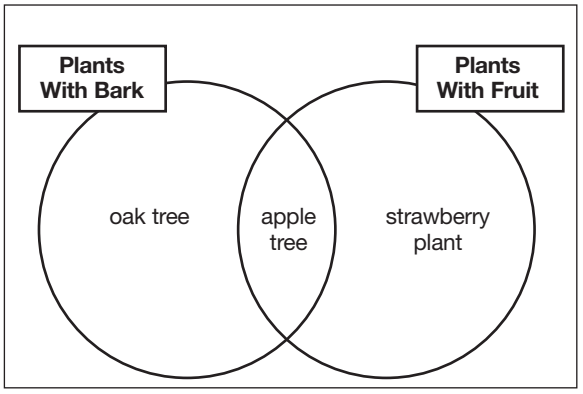
Single Sorting Mat



Double Sorting Mat



Double Venn



Measuring

Measuring is the process of discovering the dimensions or quantity of objects or events and, at the grade 5 level, usually involves comparing, ordering, and measuring objects by length, area, volume, and mass. For example, students will measure mass/weight, length, volume, and temperature using standard units and tools. They will also measure the passage of time using seconds, minutes, and hours, and use protractors to measure angles in degrees to 180 degrees.

An essential skill of measurement is estimating. Encourage students to estimate before they measure, whether in nonstandard or standard units. Estimation provides opportunities for students to take risks, use prior knowledge, and enhance their measuring skills by comparing estimates and actual results.

Communicating, Analyzing, and Interpreting

In science and technology, communication is achieved through diagrams, graphs, charts, maps, models, and symbols, as well as written and spoken language. Communicating includes:

- reading and interpreting data from tables and charts
- constructing tables and charts
- reading and interpreting data from pictographs
- constructing pictographs
- constructing labelled diagrams
- constructing models
- using oral and written language
- sequencing and grouping events, objects, and data according to attributes

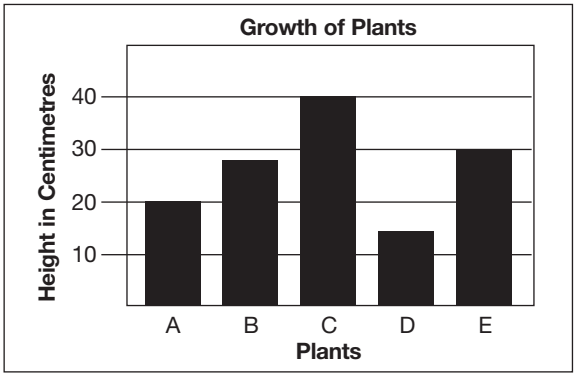
Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

When presenting students with charts and graphs, or when students make their own charts and graphs as part of a specific activity, the following guidelines should be followed:

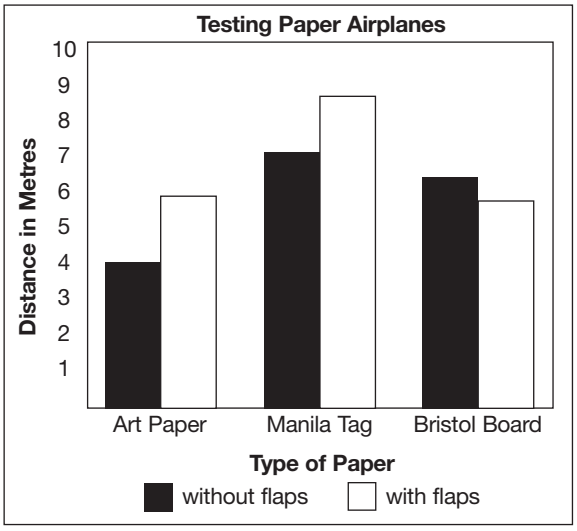
- A **pictograph** has a title and information on one axis that denotes the items being compared. (Note that the first letter of each word of both the title and the axis text is capitalized.) There is generally no graduated scale or heading for the axis representing numerical values.

Favourite Dessert				
				
				
				
				
Cake	Pie	Ice Cream		

- A **bar graph** is another common form of scientific communication that students use in grade 5. Bar graphs should always be titled so the information communicated is easily understood. These titles should be capitalized in the same manner as one would title a story. Both axes of the graph should also be labelled and capitalized the same way. In most cases, graduated markings are noted on one axis and the objects or events being compared are noted on the other. On a bar graph, the bars must be separate, as each bar represents a distinct piece of data.



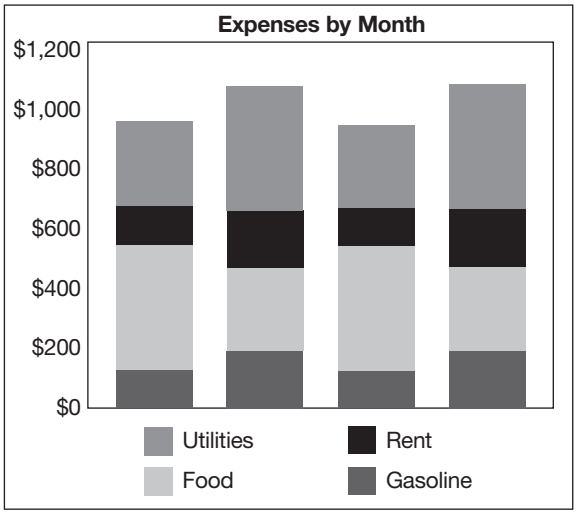
- A **double bar graph** can also be used to communicate scientific results. This type of graph is commonly used when comparing similar attributes in different objects. For example, an investigation into flight may have students constructing model airplanes with and without flaps, from different types of paper. The resulting double bar graph may look as follows:



- **Stacked-bar graphs** display the data values proportionally. Stacked-bar graphs can be used to display percent or relative frequency. Each bar in the graph represents a whole, and each of the segments in a bar represents a different category. Different colours are

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

used within each bar to easily distinguish between categories. The example below demonstrates how bars are stacked.



- A **stem-and-leaf plot** displays data that is organized by place value. The plot clearly shows the greatest, least, and median values in a set of data. The following stem-and-leaf plot shows books read over the summer by 10 students with these results: 6, 7, 10, 12, 12, 15, 19, 21, 23, 25.

Stem	Leaf
0	6 7
1	0 2 2 5 9
2	1 3 5

- A **chart (table)** has an appropriate title, and both columns and rows need specific headings. (Note that the first letter of each word in all titles and headings is capitalized.) In some cases, pictures can be used alongside or in place of words to make the chart easier for young students to understand. Charts can be made in the form of checklists or can include room for additional written information and data.

Checklist Chart

Which Substances Dissolve in Water?		
Substance	**Dissolves in Water**	**Does Not Dissolve in Water**
Beads		√
Sugar	√	
Drink Mix	√	
Rice		√
Pepper		√

Data Chart

Local Snowfall		
Month	**2023/2024 Snowfall (cm)**	**Average Snowfall (cm)**
October	7	5
November	9	8
December	23	20
January	29	25
February	16	18
March	11	10

- A **frequency table** is a means of recording the frequency of occurrence. A tally chart is one type of frequency chart commonly used in grade 5. In this kind of chart, data is recorded as an organized count. The count is grouped in fives so the total can be easily determined by counting by fives.

Favourite Sport		
Sport	**Tally**	**Total**
baseball	𝍸 |	6
hockey	𝍸 𝍸	10
soccer	𝍸 𝍸 ||	12

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

- In grade 5, students also learn to make **infographics** to display data in various ways, such as using tables, plots, graphs, and images. For example:



"Print" by Flickr User NOAA's National Ocean Service. Used under Public Domain licence.

Predicting

Predicting refers to the question, "What do you think will happen?" For example, ask students to predict what they think will happen to a blown-up balloon that is placed in a basin of water. It is important to provide opportunities for students to make predictions and for them to feel safe doing so.

NOTE: Teachers are encouraged to look for connections to Indigenous perspectives and knowledge whenever possible. For example, similar to a balloon, in many Indigenous cultures, fish stomachs and sealskins were traditionally used as flotation devices. The scientific concept is the same.

Inferring

In a scientific context, inferring generally refers to asking why something occurs. For example, ask students to infer why a blown-up balloon floats when placed in a basin of water. Again, it is important to encourage students to take risks when making inferences. Instead of explaining scientific phenomena to them, give students opportunities to infer for themselves using a variety of perspectives, and then build their knowledge base through inquiry and investigation.

Inquiry Through Investigation and Experimentation

When investigations and experiments are conducted in the classroom, it is essential to plan and record both the process and the results. The traditional scientific method uses the following format:

- purpose: what we want to find out, or a testable question we want to answer
- hypothesis: a prediction; what we think will happen and why
- materials: what we used to conduct the experiment or investigation
- method: what we did
- results: what we observed and measured
- conclusion: what we found out
- application: how we can use what we learned

This method of recording results is appropriate at the grade 5 level. However, in some cases, it may be more appropriate to focus on a narrative style of reporting that includes the following:

- what we want to know
- what we think might happen
- what we used
- what we did
- what we observed
- what we found out

A simpler four-question narrative that includes the following questions may also be used with any age group.

1. What was I looking for? (Describe the question you were trying to answer or the hypothesis/prediction you were testing.)

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

2. How did I look for it? (Tell what you did. Include materials and method.)
3. What did I find? (Describe observations and data.)
4. What does this mean? (Draw conclusions and consider applications to real life.)

This narrative may be completed in a variety of ways: oral discussion as a class, recording findings as a class, having students use drawings and writing to communicate independently, or a combination of these.

Throughout ***Hands-On Science and Technology***, a variety of methods are used to encourage students to communicate the inquiry process, including those listed above. Formats such as concept maps and other graphic organizers are also used.

Engineering Design Process

Throughout ***Hands-On Science and Technology***, students have opportunities to use technological problem-solving skills to design and construct objects. For example, in unit 1, lesson 4, students design and construct a model of the digestive system.

The engineering design process involves having students seek solutions to practical problems. The process includes the following steps:

1. **Identify a need**. Recognize practical problems and the need to solve them.
2. **Create a plan**. Seek alternate solutions to a given problem, create a plan based on a chosen solution, and record the plan in writing and using labelled diagrams.
3. **Develop a product or prototype**. Construct an object that solves the given problem, and use predetermined criteria to test the product.
4. **Communicate the results**. Identify and make improvements to the product and explain the changes.

The engineering design process also involves research and experimentation.

When the engineering design process is featured in a lesson of ***Hands-On Science and Technology***, the following icon is used:



Inquiry Through Research

In addition to hands-on inquiry, research is another aspect of inquiry that involves finding, organizing, and presenting information related to a specific topic or question. Even at a young age, students can begin to research topics studied in class if they are provided with support and guidelines. This is also an effective way to integrate oral communication, reading, writing, and media literacy expectations from the Ontario language curriculum for grades 1–8 (2023).

Guided research is a teaching and learning strategy that is encouraged throughout ***Hands-On Science and Technology***. Guided research provides an opportunity for students to seek further information about subjects of inquiry, personal interests, or topics of their choice. Accordingly, students are empowered and engaged in the process. Guided research encourages students and teachers to do the following:

Students	Teachers
■ ask questions of interest related to a topic being studied by the class ■ choose resources ■ collect information ■ make a plan to present findings ■ present research in a variety of ways	■ provide opportunities for students to ask questions of personal interest ■ provide access to appropriate resources ■ model and support the research process ■ offer opportunities for students to present their findings in a variety of ways and to a variety of audiences

▶

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

In ***Hands-On Science and Technology***, the approach to scientific inquiry and research is one of gradual release, where the teacher provides substantial support in initial inquiry experiences, and gradually presents students with more and more opportunities for directing their own research. Suggestions for guiding research are presented regularly throughout ***Hands-On Science and Technology***.

Online Considerations

As our technological world continues to expand at an accelerating rate and information is increasingly available online, students will turn to the internet more and more. Accordingly, ***Hands-On Science and Technology*** is replete with opportunities for students to use online resources for research and investigation. Discuss online safety protocols with students and be vigilant in supervising their internet use. Review websites and bookmark those that are appropriate for student use.

Discuss plagiarism with students; explain that copying information word for word—from a book, the internet, AI online sources, or any other resource—is wrong. Such information should usually be paraphrased in the student's own words (sometimes including short direct quotations marked as such), and the source of the information cited. Photos, drawings, figures, and other images found online should also only be used with permission and citation of the source. Alternatively, students can source images for which permission has already been granted for use, such as through Creative Commons Canada, a nonprofit organization that "promotes and enables the sharing of knowledge and creativity…[and] produces and maintains a free suite of licensing tools to allow anyone to easily share, reuse, and remix materials with a fair 'some rights reserved' approach to copyright." See <http://ca.creativecommons.org>.

Addressing Students' Literacy Needs

The inquiry process involves having students ask questions and conduct investigations and research to answer these questions. At the grade 5 level, students may benefit from support for research, reading, and writing. Consider having volunteers, student mentors, or educational assistants help students during these processes. In some cases, such helpers may also scribe for students to communicate their findings.

References

Creative Commons Canada. http://ca.creativecommons.org.

Ontario Ministry of Education. *The Ontario Curriculum, Grades 1–8: Language,* 2023. https://www.dcp.edu.gov.on.ca/en/curriculum/elementary-language/downloads.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

The *Hands-On Science and Technology* Assessment Plan

Hands-On Science and Technology provides a variety of assessment tools that enable teachers to build a comprehensive and authentic daily assessment plan for students. Based on research about the value of quality classroom assessment (Davies, 2020), lessons include suggestions for authentic assessment, which includes assessment *for* learning, assessment *as* learning, and assessment *of* learning.

Ontario's policy on assessment is outlined in the document *Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools* (2010). The document describes the roles of teachers and students in the learning and assessment process:

> In a traditional assessment paradigm, the teacher is perceived as the active agent in the process, determining goals and criteria for successful achievement, delivering instruction, and evaluating student achievement at the end of a period of learning. The use of assessment for the purpose of improving learning and helping students become independent learners requires a culture in which student and teacher learn together in a collaborative relationship, each playing an active role in setting learning goals, developing success criteria, giving and receiving feedback, monitoring progress, and adjusting learning strategies. The teacher acts as a "lead learner," providing support while gradually releasing more and more responsibility to the student, as the student develops the knowledge and skills needed to become an independent learner. (p. 30)

Hands-On Science and Technology supports Ontario's *Growing Success* policy by focusing assessment suggestions on the learning process during performance-based activities. Although many of the suggestions involve student writing, there are no tests or quizzes included with the units. This is because each lesson includes such a wide variety of suggested activities for teachers to choose from that tests and quizzes could not possibly reflect the specific tasks in which students participated. Since assessment needs to be directly connected to learning, ***Hands-On Science and Technology*** suggests assessment strategies that can be used in a variety of ways, and that can be modified for use with individual students or groups of students.

The primary purpose of assessment is to improve student learning. Assessment *for* learning provides students with descriptive feedback and coaching for improvement. Assessment *as* learning helps students self-assess by developing their capacity to set their own goals, monitor their own progress, determine next steps, and reflect on their learning. Assessment *of* learning is summative in nature and is conducted by teachers to identify student progress in relation to learning expectations. The challenge for teachers is to integrate assessment seamlessly with other learning goals. The Ontario assessment model, described in *Growing Success*, uses the following process:

- **Establish learning goals from curriculum expectations**. Develop learning goals from curriculum expectations and include them in lessons, using student-friendly language. Share them with students and use them to guide instruction.
- **Develop success criteria**. Establish success criteria, using assessment task exemplars of student work or the Achievement Chart for Science and Technology (provided on page 39) from *The Ontario Curriculum, Grades 1–8: Science and Technology* (2022), or in collaboration with students. Write these descriptors in student-friendly language to help students understand what successful learning looks like.
- **Provide descriptive feedback**. In conversations with students, identify what criteria they have and have not met, and provide any needed instruction. Work

▶

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

with students to determine next steps and how they can improve. This may include differentiating instruction.

- **Use information for peer and self-assessment**. Have students assess their own work and the work of their peers to determine what still needs to be done.
- **Establish individual goals**. Encourage students to determine what they need to learn next and how to get there.

Hands-On Science and Technology encourages assessment strategies that infuse these five elements of the Ontario assessment model, providing assessment suggestions, rubrics, and templates that can be used during the teaching/learning process. Assessment suggestions include tasks related to assessment for learning, assessment as learning, and assessment of learning.

Assessment *for* Learning

It is important to assess students' understanding before, during, and after a lesson. This information will help you determine students' needs and plan next steps in instruction.

Begin by finding out what students already know. This will allow you to identify misconceptions students may have about science and technology concepts and can help when making connections to new learning.

To assess students as they work, use the assessment *for* learning suggestions provided with many activities. While observing and conversing with students, consider using one or both of the following templates to record assessment *for* learning data:

- **Anecdotal Record:** To gain an authentic view of student progress, it is critical to record observations *during* lessons. The ANECDOTAL RECORD template (page 35) provides a format for recording observations about individuals or groups.
- **Individual Student Observations**: To focus more on individual students over a longer period of time, consider using the INDIVIDUAL STUDENT OBSERVATIONS template (page 35). This template provides more space for comments and is especially useful during conferences, interviews, or individual student performance tasks.

Assessment *as* Learning

It is important for students to reflect on their own learning in relation to science and technology. For this purpose, a STUDENT SELF-ASSESSMENT template is provided (page 35), as well as a STUDENT REFLECTIONS template (page 35).

In addition, the SCIENCE AND TECHNOLOGY JOURNAL (page 36) can be used to encourage students to reflect on their own learning. Print several copies for each student, cut the pages in half, add a cover, and bind the pages together. Students can create their own title pages for their journals. For variety, have students use the blank reverse side of each page for other reflections, such as drawing or writing about:

- new science and technology challenges
- favourite science and technology activities
- real-life experiences with science and technology
- new terminology
- new places explored during investigations

Students may also journal in other ways, such as by adding notes to their portfolios, or by keeping online science and technology blogs or journals to record successes, challenges, and next steps relating to the learning goals.

NOTE: The SCIENCE AND TECHNOLOGY JOURNAL template is provided as a suggestion, but journals can also be made from simple notebooks or recycled paper.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

When working in groups, students will benefit from reflecting on their ability to listen to others respectfully, share ideas, and participate actively in the inquiry process. For this purpose, use the COLLABORATION SKILLS SELF-ASSESSMENT template (page 36).

Assessment *of* Learning

Assessment *of* learning provides a summary of student progress related to accomplishing the learning goals at a particular point in time. To draw conclusions about what a student knows and can do, it is important to gather a variety of assessment data. Consider collecting student products, observing processes, and having conversations with students. Determine which student work is formative and which is summative, and use only the most recent and consistent evidence.

Assessment *of* learning suggestions are provided throughout units of study and in the culminating lesson of each unit of ***Hands-On Science and Technology***. To record student results, use the ANECDOTAL RECORD template (page 35), the INDIVIDUAL STUDENT OBSERVATIONS template (page 35), and the RUBRIC (page 37).

Always assess a student's individual accomplishments, rather than the work they do in a group. However, you may assess *how* an individual student works within a group. Such skill development includes the ability to listen to others respectfully, share ideas, and participate actively in the inquiry process. For this purpose, use the COLLABORATION SKILLS TEACHER ASSESSMENT template (page 36).

As mentioned on page 30, ***Hands-On Science and Technology*** does not provide tests and quizzes for units of study. Any formal assessment of students needs to be connected to the specific skills and concepts focused on during lessons, and since each teacher will select different activities from those provided within each lesson, assessment tasks will look different in each classroom. Consider focusing on the various assessment suggestions provided and using the Achievement Chart for Science and Technology on page 39 as your guide.

Performance Assessment

Both assessment *for* learning and assessment *of* learning include performance assessment. Performance assessment is planned, systematic observation and assessment based on students actually doing a specific science and technology activity. Teacher- or teacher/student-created rubrics can be used to assess student performance.

Use the SAMPLE RUBRIC and the RUBRIC template (page 37) for this assessment. For any specific activity, before the work begins, discuss with students success criteria for completing the task. This will ensure that the success criteria relate to the lesson's learning goals. Record these criteria on the rubric.

When conducting assessment *for* learning, review the rubric with students to determine strengths, challenges, and next steps related to learning goals.

When conducting assessment *of* learning, use the rubric to determine summative data. For example, use the rubric criteria to assess student performance, and students can receive a check mark for each criterion accomplished to determine a rubric score from a total of four marks. These rubric scores can then be transferred to the RUBRIC CLASS RECORD template (page 37).

When using the rubric for assessment *of* learning, consider using four levels of achievement to correlate with the Achievement Chart for Science and Technology (page 39).

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

For example:

1. achievement that falls much below the provincial standard
2. achievement that approaches the provincial standard
3. achievement that meets the provincial standard
4. achievement that surpasses the provincial standard

Hands-On Science and Technology provides numerous opportunities for students to apply their skills. Consider using the same levels of achievement throughout the year to track student learning and determine when students have a thorough understanding and demonstrate in-depth application of concepts and skills.

Portfolios

A portfolio is a collection of work that shows evidence of a student's learning. There are many types of portfolios—the showcase portfolio and the progress portfolio are two popular formats. *Showcase portfolios* highlight the best of students' work, with students involved in selecting pieces and justifying their choices. *Progress portfolios* reflect students' progress as their work improves and aim to demonstrate in-depth understanding of the materials over time.

Select, with student input, work to include in a science and technology portfolio or in a science and technology section of a multi-subject portfolio. Selections should include representative samples of student work in all types of science and technology activities.

Use the PORTFOLIO TABLE OF CONTENTS template (page 37) and PORTFOLIO ENTRY RECORD (page 38) to organize the portfolio.

Indigenous Perspectives on Assessment

From an Indigenous perspective, assessment is community-based, qualitative, and holistic, and includes input from all the people who influence an individual student's learning—parents, caregivers, Elders, Knowledge Keepers, community members, and teachers. An assessment that includes all these perspectives provides a balanced understanding of what represents success for Indigenous students and their family/community. A strong partnership between parents/guardians/community and school improves student achievement. Be aware that some Indigenous students may feel apprehensive about a formal process of assessment; others may find that Western achievement goals do not fit their worldview. In ***Hands-On Science and Technology***, consideration has been given to assessment from an Indigenous perspective. The following suggestions support this perspective:

- Consider learning and assessment in a holistic way, acknowledging that each student will find identity, meaning, and purpose through connections to the community, the natural world, and values such as respect and gratitude.
- Directly questioning the information being taught is not necessarily common to the process of gaining knowledge within an Indigenous perspective; instead, observation and waiting to gain understanding may be more familiar. Acknowledge this cultural difference and reassure students that the observations they make and their ability to demonstrate their understanding are valid.
- Incorporate family and community in learning and assessment. Include parents/caregivers, siblings, grandparents, aunts and uncles, cousins, and community members such as Elders, Knowledge Keepers, daycare

▶

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

staff, babysitters, and coaches. For this purpose, consider using the FAMILY AND COMMUNITY CONNECTIONS: ASSESSING TOGETHER template (page 36). After any lesson or module, students can take home a copy of this template to complete with family or community members (with permission). This template can also be completed by students in pairs, to enhance the sense of community in the classroom.

- Have students take home one of their self-assessment templates (STUDENT SELF-ASSESSMENT, STUDENT REFLECTIONS, SCIENCE AND TECHNOLOGY JOURNAL, or COLLABORATION SKILLS SELF-ASSESSMENT) to explain it to a family or community member. These templates can also be shared with a peer to enhance the sense of community within the school.

Evidence of Student Achievement Levels for Evaluation

At the end of each unit, determine achievement levels for each student. Assessment *of* learning information gathered throughout the unit can be used to identify these levels, according to the Ontario Achievement Chart for Science and Technology. The most recent and consistent assessment information should be used to determine achievement levels. The Achievement Chart for Science and Technology is provided on page 39.

Important Note to Teachers

Throughout ***Hands-On Science and Technology***, suggestions are provided for assessment *for* learning, assessment *as* learning, and assessment *of* learning. Keep in mind that these are merely suggestions. Use the assessment strategies presented in a wide variety of ways, and build an effective assessment plan using these assessment ideas, as well as your own valuable experiences as a teacher.

References

Davies, Anne. *Making Classroom Assessment Work* (4th ed.). Courtenay, BC: Connections Publishing, 2020.

Ontario Ministry of Education. *Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools; Covering Grades 1 to 12*, 2010. http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf.

Ontario Ministry of Education. *The Ontario Curriculum, Grades 1–8: Science and Technology*, 2022. https://www.dcp.edu.gov.on.ca/en/curriculum/science-technology.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Achievement Chart for Science and Technology

The achievement chart identifies four categories of knowledge and skills and four levels of achievement in science and technology.

1. Knowledge and Understanding – Subject-specific content acquired in each grade (knowledge), and the comprehension of its meaning and significance (understanding)				
Categories	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	The student:			
Knowledge of content (e.g., facts, terminology, definitions)	demonstrates limited knowledge of content	demonstrates some knowledge of content	demonstrates considerable knowledge of content	demonstrates thorough knowledge of content
Understanding of content (e.g., concepts, ideas, theories, principles, procedures, processes)	demonstrates limited understanding of content	demonstrates some understanding of content	demonstrates considerable understanding of content	demonstrates thorough understanding of content
2. Thinking and Investigation – The use of critical and creative thinking skills and inquiry and problem-solving skills and/or processes				
Categories	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	The student:			
Use of initiating and planning skills and strategies (e.g., formulating questions, identifying the problem, developing hypotheses, scheduling, selecting strategies and resources, developing plans)	uses initiating and planning skills and strategies with limited effectiveness	uses initiating and planning skills and strategies with some effectiveness	uses initiating and planning skills and strategies with considerable effectiveness	uses initiating and planning skills and strategies with a high degree of effectiveness
Use of processing skills and strategies (e.g., performing and recording; gathering evidence and data; examining different points of view; selecting tools, equipment, materials, and technology; observing; manipulating materials; proving)	uses processing skills and strategies with limited effectiveness	uses processing skills and strategies with some effectiveness	uses processing skills and strategies with considerable effectiveness	uses processing skills and strategies with a high degree of effectiveness
Use of critical/creative thinking processes, skills, and strategies (e.g., analysing, interpreting, problem solving, evaluating, forming and justifying conclusions on the basis of evidence, developing solutions, considering diverse perspectives)	uses critical/ creative thinking processes, skills, and strategies with limited effectiveness	uses critical/ creative thinking processes, skills, and strategies with some effectiveness	uses critical/ creative thinking processes, skills, and strategies with considerable effectiveness	uses critical/ creative thinking processes, skills, and strategies with a high degree of effectiveness

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

3. Communication – The conveying of meaning through various forms				
Categories	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	The student:			
Expression and organization of ideas and information in oral, visual, and/or written forms (e.g., diagrams, models, articles, project journals, reports)	expresses and organizes ideas and information with limited effectiveness	expresses and organizes ideas and information with some effectiveness	expresses and organizes ideas and information with considerable effectiveness	expresses and organizes ideas and information with a high degree of effectiveness
Communication for different audiences (e.g., peers, adults, community members) **and purposes** (e.g., to inform, to persuade) **in oral, visual, and/or written forms**	communicates for different audiences and purposes with limited effectiveness	communicates for different audiences and purposes with some effectiveness	communicates for different audiences and purposes with considerable effectiveness	communicates for different audiences and purposes with a high degree of effectiveness
Use of conventions, vocabulary, and terminology of the discipline in oral, visual, and/or written forms (e.g., symbols, formulae, International System of Units)	uses conventions, vocabulary, and terminology of the discipline with limited effectiveness	uses conventions, vocabulary, and terminology of the discipline with some effectiveness	uses conventions, vocabulary, and terminology of the discipline with considerable effectiveness	uses conventions, vocabulary, and terminology of the discipline with a high degree of effectiveness
4. Application – The use of knowledge and skills to make connections within and between various contexts				
Categories	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	The student:			
Application of knowledge and skills (e.g., concepts and processes; procedures related to the safe use of tools, equipment, materials, and technology; investigation skills) **in familiar contexts**	applies knowledge and skills in familiar contexts with limited effectiveness	applies knowledge and skills in familiar contexts with some effectiveness	applies knowledge and skills in familiar contexts with considerable effectiveness	applies knowledge and skills in familiar contexts with a high degree of effectiveness
Transfer of knowledge and skills (e.g., concepts and processes, safe use of equipment and technology, investigation skills) **to new contexts**	transfers knowledge and skills to new contexts with limited effectiveness	transfers knowledge and skills to new contexts with some effectiveness	transfers knowledge and skills to new contexts with considerable effectiveness	transfers knowledge and skills to new contexts with a high degree of effectiveness

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Making connections within and between various contexts (e.g., connections between sciences; connections to everyday and real-life situations; connections among concepts within science and technology; connections involving use of prior knowledge and experience; connections among science and technology and other disciplines, including other STEM [science, technology, engineering, and mathematics] subjects)	makes connections within and between various contexts with limited effectiveness	makes connections within and between various contexts with some effectiveness	makes connections within and between various contexts with considerable effectiveness	makes connections within and between various contexts with a high degree of effectiveness
Proposing courses of practical action to deal with problems relating to our changing world	proposes courses of practical action of limited effectiveness	proposes courses of practical action of some effectiveness	proposes courses of practical action of considerable effectiveness	proposes highly effective courses of practical action

Source: Ontario Ministry of Education. "Assessment and Evaluation of Student Achievement." Elementary Science and Technology (2022). https://www.dcp.edu.gov.on.ca/en/curriculum/science-technology/context/evaluation.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Unit 1

Human Organ Systems

About This Unit

The focus of this unit of ***Hands-On Science and Technology for Ontario, Grade 5*** is the human body, including its various systems and the care of each system. Students will investigate each system and explore ways to maintain healthy bodies through balanced nutrition and exercise. They will relate this knowledge to medical advancements and ways that food literacy can support decisions that affect physical and mental health.

Planning Tips for Teachers

- The lessons in ***Hands-On Science and Technology for Ontario, Grade 5*** rely on resources for both students and teachers (see Resources for Students, page 48), including a good dictionary of biological terms. As much as possible, collect these resources in advance.
- Contact local healthcare organizations and government departments well in advance for classroom materials. Find resources related to the human body, illness, and diseases—check with local clinics, dental offices, medical professional offices, hospitals, public health offices, and pharmacies, as well as with national health organizations (e.g., Health Canada, Diabetes Canada, Canadian Lung Association, Canadian Dental Association, Crown-Indigenous Relations and Northern Affairs Canada, Indigenous Services Canada).
- Collect nutrition panels from food packages, illustrated grocery-store flyers, food magazines, reference materials about nutritional elements, and cookbooks for children.
- Collect various materials related to Canada's Food Guide (<https://food-guide.canada.ca/en/>) and "Healthy eating and food safety for Indigenous peoples" (<https://www.sac-isc.gc.ca/eng/1581522106156/1581522147811>). Collect in advance specific scientific equipment required for the unit: model of human skeleton, microscopes, slides, cover slips, iodine, and commercially prepared slides of human skin cells.
- Check with the Indigenous lead at your school board office for a list of Elders and Knowledge Keepers to visit your classroom.
- Whenever possible, use reusable or recycled items for classroom experiments and demonstrations. For example, rather than single-use zipper-lock bags, use silicon or sturdy plastic bags that can be washed and reused.
- Consider recording each lesson's guided inquiry question on chart paper for display throughout related investigations.

STEM Makerspace

Add unit-specific materials to your Makerspace that encourage learning about human organ systems. These are in addition to the general materials listed in the introduction to ***Hands-On Science and Technology for Ontario, Grade 5*** (see page 19). Include various models of human body parts and systems, sample X-rays, fitness trackers, heart rate monitors, and stopwatches. Also include lab materials such as beakers, graduated cylinders, scales, measuring cups and spoons, syringes, plastic tubing, graph paper, and video-recording devices.

Indigenous Knowledge and Perspectives

Throughout this unit, continue to enhance students' science and technology education by infusing it with Indigenous perspectives as often as possible. This unit presents opportunities for students to investigate various Indigenous insights and understandings of health and healthy bodies.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Traditionally, many Indigenous Peoples were hunters and gatherers. They sought balance between daily activity and proper nutrition. Indigenous Peoples recognized the connection between people, the food consumed, and daily activities, and took an integrative approach to a balanced mind, body, and lifestyle. Today, this lifestyle continues in some capacity, with some Indigenous communities incorporating some or all aspects of traditional life along with the addition of new foods and medicines.

Science and Technology Vocabulary

Throughout this unit of ***Hands-On Science and Technology for Ontario, Grade 5***, use, and encourage students to use, vocabulary such as:

- *Canada's Food Guide, carbohydrate, circulatory system, digestive system, fat, food group, integumentary system, mineral, muscular system, nervous system, nutrient, protein, respiratory system, serving size, skeletal system, vitamin*

Due to the extensive new vocabulary presented in this unit, terminology is often suggested within the context of a diagram of the body system. Students often understand unfamiliar words better through both visual and hands-on experience. Visual demonstrations (e.g., attaching a "pancreas" to a model of the digestive system) keeps students engaged, possibly inspiring them to learn about the organ more than if they simply heard the word *pancreas.*

Infuse vocabulary related to scientific and technological inquiry skills into daily lessons. Display this vocabulary in the classroom throughout the year, as it relates to all science and technology units. Have students determine which skills they are being asked to use as they work through particular lessons. Discuss what the skill looks and sounds like as students explore and investigate. Vocabulary related to scientific and technological inquiry skills includes:

- *access, ask, brainstorm, collect, compare, connect, consider, construct, cooperate, create, describe, develop, estimate, explain, explore, find, follow, graph, identify, improve, investigate, measure, observe, order, plan, predict, recognize, record, repeat, research, respond, select, sequence, test*

In lesson 1, have students begin a Science and Technology Glossary in which they will record new vocabulary introduced throughout the unit. Also in lesson 1, create a word wall for the unit on a bulletin board, poster paper, or chart paper. Record new vocabulary on the word wall as it is introduced. Ensure the word wall is located where all students can see it. Refer frequently to new words and encourage students to use them in both their writing and conversation.

NOTE: Include terminology in languages other than English on the class word wall. This is a way of acknowledging and respecting students' cultural backgrounds, while enhancing learning for all students. Use resources such as Google Translate and Microsoft Translator. To translate terms to Indigenous languages, there are a variety of online dictionaries available. For example:

- **The Ojibwe People's Dictionary <ojibwe.lib.umn.edu/>**
- **Freelang Mohawk-English Dictionary <www.freelang.net/online/mohawk.php>**
- **Nishnaabemwin Dictionary <https://dictionary.nishnaabemwin.atlas-ling.ca/#/help>**
- **First Voices: Explore Languages <https://www.firstvoices.com/explore/FV/sections/Data>**

Online dictionaries are also available for other languages that may be reflective of the class population.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Promoting Scientific Inquiry

Throughout the inquiry process, it is essential for teachers and students to generate thoughtful questions about the scientific information and issues presented. Many questioning systems can be applied to the material within the unit. Simply changing a question can shift the focus from knowledge and understanding to scientific inquiry, which can lead to use of engineering and scientific design. The chart below shows how questions related to topics of study in this unit, and which address specific curriculum expectations, can either focus on knowledge and understanding (as in column two) or encourage more in-depth inquiry and higher-level thinking (as in column three) and then lead to engineering and scientific design (column four). A questioning system such as this can be used by both teachers and students to reach beyond factual content toward rich, inquiry-based investigations.

Unit Topic	**Knowledge and Understanding** (content questions that range in complexity)	**Scientific Inquiry** (testable questions by students or by scientists)	**Engineering and Scientific Design** (prototype questions designed or critiqued by students)
Heart rate	What is a pulse?	What impact does exercise have on your pulse?	What is useful information for a fitness tracker to record?
Skin	Why does the skin need protection from the Sun?	Can tanning be a safe practice?	What features do the best sunscreens have?
Food choices	How many servings of fruits and vegetables should you have each day?	How is appropriate serving size determined?	Why was the Canada Food Guide recently updated?

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Curriculum Correlation Chart

Overall Expectation	Specific Expectation	Lesson									
		1	2	3	4	5	6	7	8	9	10
B1. Relating Science and Technology to Our Changing World: analyse impacts of various social and environmental factors, human activities, and technologies on human health	**B1.1** assess effects of a variety of social and environmental factors on human health, and describe ways in which individuals can reduce the harmful effects of these factors and take advantage of those that are beneficial	√		√							√
	B1.2 evaluate beneficial and harmful effects of various technologies on human health and body systems, while taking different perspectives into consideration				√			√			√
	B1.3 explain how food literacy can support decisions that affect physical and mental health		√								
B2. Exploring and Understanding Concepts: demonstrate an understanding of the structure and function of human body systems and interactions within and between systems	**B2.1** identify systems of the human body, and describe their basic function			√	√	√	√	√	√	√	√
	B2.2 describe the basic structure and function of vital organs in various systems in the human body			√	√	√	√	√	√	√	
	B2.3 describe interrelationships between human body systems			√	√	√	√	√	√	√	
	B2.4 identify various diseases and medical disorders in humans and the organs and/or body system or systems that they affect			√							√

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Resources for Students

NOTE: Resources marked with an asterisk are considered authentic resources. This means that traditional stories reference the Indigenous community they came from, they state the individual that shared the story and gave permission for the story to be used publicly, and the person who originally shared the story is Indigenous. Stories that are works of fiction were written by an Indigenous author. For more information, please see Authentic First Peoples Resources at <http://www.fnesc.ca/>.

Books

New Hands, New Life: Robots, Prostheses and Innovation, Jan Andrysek and Alex Mihailidis (Firefly Books, 2017).

Eat Up!: An Infographic Exploration of Food, Antonia Banyard and Paula Ayer (Annick, 2017).

The Body Book: Blood, Bones, Guts, and More, Bipasha Choudhury (DK Publishing, 2022).

**The Three Sisters,* Michelle Corneau (Strong Nations Publishing, 2016).

**Relatives with Roots: A Story About Métis Women's Connection to the Land,* Leah Marie Dorion (Gabriel Dumont Institute, 2011).

**Wild Berries,* Julie Flett (Simply Read Books, 2013). (new publication coming 2025)

Inside the Skin, Hair & Nails, Karin Halvorson (Abdo, 2016).

**Games of Survival: Traditional Inuit Games for Elementary School Students,* Johnny Issaluk (Inhabit Media, 2012).

**Akhwatsirehkó:wa My Big Family: Our Game, Our Experience, Our Way,* Brennor Jacobs (Turtle's Back, 2020).

A Vaccine Is Like a Memory, Rajani LaRocca (Little Bee Books, 2023).

**Lessons From Mother Earth,* Elaine McLeod (Groundwood Books, 2010).

**All Creation Represented: A Child's Guide to the Medicine Wheel,* Joyce Perreault (Peppermint Toast, 2018).

**Ziis-baak-daa-keng Maple Syrup Harvesting,* Lucy Pitawanakwat and Honourine Trudeau-Wright (Wikwemikong Heritage Organization, 2004).

Stephen Biesty's Incredible Body Cross-Sections, Richard Platt and Stephen Biesty (DK Publishing, 2020).

**Kihcite Metawewina: Playing with a Great Heart,* Blair Robillard (Manitoba Aboriginal Sports and Recreation Council, 2019).

Every Body: A Celebration of Diverse Abilities, Shelley Rotner (Holiday House, 2023).

Oh, The Thinks You Can Think!, Dr. Seuss (Penguin Random House, 2014).

Human Body, DK Eyewitness series, Richard Walker (DK Publishing, 2023).

**The Vision Seeker,* James Whetung (Fitzhenry & Whiteside, 2022).

**Sky Wolf's Call: The Gift of Indigenous Knowledge,* Eldon Yellowhorn and Kathy Lowinger (Annick, 2022).

Body Music: Poems About the Noises Your Body Makes, Jane Yolen and Ryan G. Van Cleve (Moonshower, 2023).

Websites

- **https://downiewenjack.ca/four-sacred-medicines/**
  Anishinaabe Teachings of the Four Sacred Medicines—Gord Downie & Chanie Wenjack Fund: Information and Anishinaabe teachings about tobacco, sage, cedar, and sweetgrass.

▶

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

- **https://www.diabetes.ca/**
  Diabetes Canada: Find information about diabetes and its treatment, diabetic-friendly recipes, and support services.
- **https://www.theguardian.com/world/2021/apr/30/canada-first-nations-justin-trudeau-drinking-water**
  "Dozens of Canada's First Nations Lack Drinking Water: 'Unacceptable in a Country so Rich.'" Leyland Cecco. The Guardian. April 30, 2021.
- **www.theurbanfarmer.ca/edible-plants-for-the-prairies**
  Edible Plants for the Prairies—The Urban Farmer: Extensive, detailed list of edible plants found on the prairies.
- **https://food-guide.canada.ca/en/food-guide-snapshot/**
  Food Guide Snapshot: Eat Well. Live Well—Health Canada: Downloadable pdf.
- **https://tctrail.ca**
  Trans Canada Trail: Includes an interactive map of the Trans Canada Trail, Canada's national trail.
- **https://www.canada.ca/en/health-canada/**
  Health Canada—Government of Canada: Information on topics from nutrition to self-image to active living. Find Canada's food guide under "Food and Nutrition" on the main page.
- **https://thehumanbodygame.co.uk/**
  The Human Body—Siemens Healthcare Interactive: Includes MRI and X-ray images of various parts of the human body, along with interactive links and games about the body's systems.
- **https://kids.aboutkidshealth.ca**
  Health Games & Videos for Kids—The Hospital for Sick Children, Toronto: Interactive activities on hygiene, safety, and how the body works.
- **https://www.diabetes.ca/diabetescanadawebsite/media/managing-my-diabetes/tools%20and%20resources/just-the-basics.pdf?ext=.pdf**
  Just the Basics—Diabetes Canada: A downloadable pdf.
- **https://kidshealth.org**
  KidsHealth: Information for kids on how the body works, puberty, illnesses and injuries, and much more. There are also complementary sites for teens and parents.
- **www.motherearthwaterwalk.com/**
  Mother Earth Water Walk: Celebrates Josephine Mandamin and the Water Walkers, who draw attention to the need for clean water.
- **https://www.sac-isc.gc.ca/eng/1562856509704/1562856530304**
  Short-Term Drinking Water Advisories—Indigenous Services Canada: Learn about short-term drinking water advisories in First Nations communities south of 60.
- **https://www.ictinc.ca/blog/a-snapshot-of-on-reserve-clean-water-issues**
  "A Snapshot of On-Reserve Clean Water Issues."—Indigenous Corporate Training. November 28, 2022.
- **https://indigenouspeoplesatlasofcanada.ca/article/sport/**
  "Sport." Kyle Edwards. Canadian Geographic Indigenous Peoples Atlas of Canada: Includes the history and traditional story of lacrosse.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

- **https://www.edcan.ca/articles/teaching-by-the-medicine-wheel/**
  "Teaching by the Medicine Wheel—An Anishinaabe framework for Indigenous education." Nicole Bell. Canadian Education Association. June 9, 2014. NOTE: The term Medicine Wheel, although still used, has been replaced by more authentic ones such as the Sacred Hoop or Sacred Circle.
- **https://www.scienceworld.ca/resource/uv-beads**
  UV Beads Demonstration—Science World: An experiment that uses UV-sensitive beads to demonstrate how UV radiation works.
- **https://storymaps.arcgis.com/stories/52a5610cca604175b8fb35bccf165f96**
  "The Water Crisis in Canada's First Nations Communities." Carina Xue Luo. University of Windsor. November 14, 2021.
- **https://www.verywellhealth.com/what-does-the-appendix-do-5270731**
  "What Does the Appendix Do?" Lana Bandoim. Verywell Health. July 30, 2024.
- **www.unikkaat.com/projects/angry-inuk/where-to-buy-sealskin/**
  Where to Buy Sealskin!—Unikkaat Studios.
- **https://kidshealth.org/en/kids/water.html**
  "Why Drinking Water Is the Way to Go." KidsHealth. March 2022.
- **https://northernbushcraft.com/guide.php?ctgy=edible_plants&region=on**
  Wild Edible Plants of Ontario—Northern Bushcraft: A list of wild edible plants in Ontario, with details and pictures for each.
- **http://kidshealth.org/en/kids/pee.html**
  "Your Urinary System." KidsHealth. January 2023.

Videos

- **https://kidshealth.org/en/kids/csmovie.html**
  "How Does the Heart and Circulatory System Work," KidsHealth (6:15).
- **https://kidshealth.org/en/kids/rsmovie.html**
  "How Do the Lungs & Respiratory System Work," KidsHealth (5:21).
- **https://www.youtube.com/watch?v=Jpvuqj5nv6U**
  "The Skeleton Dance | Super Simple Songs," Super Simple Songs—Kids Songs (1:58).

Coding and STEM Resources

Plugged Coding Resources

- **blog.gamefroot.com/blog/2020/covid-19-stop-the-spread-a-code-your-own-simulation-by-gamefroot/**
  "COVID-19: Stop the Spread—Code Your Own Virus Simulation by Gamefroot." Dan Milward—The Gamefroot Blog. March 21, 2022: COVID-19 virus simulator coding tutorial.
- **https://make.gamefroot.com/games/new**
  Gamefroot: An easy-to-use tool for students to design games using a block coding interface.
- **https://letstalkscience.ca/ls/digital-literacy/heartbeat-simulation-student**
  Heartbeat Simulation Coding Tutorial—Let's Talk Science.
- **https://makecode.microbit.org/**
  Microsoft MakeCode—Micro:bit: A free online learn-to-code platform for students. Visit the Getting Started page to learn more at <https://microbit.org/get-started/user-guide/mobile/>.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

- **https://nn.inventor.city/**
  Predict a Pie with a Neural Network—Indigenous Cooking with a Dash of AI: An activity and lesson about using a neural network.

Scratch

- **https://scratch.mit.edu/**
  Scratch: A free block-based visual programming language that allows students to create animations, stories, and games through coding.

Unplugged Coding Resources

- **https://www.rnib.org.uk/living-with-sight-loss/education-and-learning/braille-tactile-codes/#**
  Braille: Tactile Codes—Royal National Institute of Blind People: Explains that Braille is a tactile coding system that allows people to read by touch. Includes links with more information on Braille coding systems, the history of Braille, and resources for learning Braille.
- **https://www.getepic.com/educators**
  Epic School: Free online books including several Choose Your Own Adventure stories that can be used to model the Digestion Story with Conditional Statements unplugged coding task in Lesson 3.
- **https://www.amnh.org/explore/ology/brain/read-with-your-fingers2**
  Read With Your Fingers—American Museum of Natural History–Ology: Create a Braille message for a friend with step-by-step instructions including a printable Braille key and Braille sheet.

Stem Resources

- **https://www.ducksters.com/science/biology/immune_system.php**
  Biology for Kids: Immune System—Ducksters.
- **https://www.ducksters.com/science/skin.php**
  Biology for Kids: The Skin—Ducksters.
- **https://www.stem.org.uk/resources/community/collection/448548/career-profiles-and-interviews-stem-professionals**
  Career Profiles and Interviews With STEM Professionals—STEM Learning.
- **https://letstalkscience.ca/careers/search**
  Career Search—Let's Talk Science: Search STEM careers and read profiles of real people in various fields.
- **https://www.teachengineering.org/activities/view/cub_human_lesson09_activity1**
  "Creating Model Working Lungs: Just Breathe." TeachEngineering.
- **https://www.who.int/news-room/feature-stories/detail/how-do-vaccines-work**
  "How Do Vaccines Work?" World Health Organization. December 8, 2020.
- **https://www.sciencebuddies.org/stem-activities/lung-model**
  "How Do We Breathe?" Sabine De Brabandere. Science Buddies: STEM Activities.
- **https://www.sciencebuddies.org/stem-activities/blood-flow-model**
  "Model Your Blood Flow." Svenja Lohner. Science Buddies: STEM Activities.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

- **https://www.icaboston.org/articles/moving-image-diy-flip-book/**
  "Moving Image: DIY Flip Book." Institute of Contemporary Art. April 9, 2020: Instructions for making flip books.
- **https://www.amnh.org/explore/ology/brain/optical-illusions-and-how-they-work**
  Optical Illusions and How They Work—American Museum of Natural History–Ology.
- **https://www.science-sparks.com/pumping-heart-model/**
  "Pumping Heart Model." Emma Vanstone. Science Sparks. January 14, 2020.
- **https://www.sciencebuddies.org/science-engineering-careers**
  Science Careers—Science Buddies: Searchable information on various careers in science and engineering.
- **https://www.sciencebuddies.org/stem-activities/spot-the-fat-in-your-snack**
  "Spot the Fat in Your Snack." Svenja Lohner. Science Buddies: Activity to make the fat in potato chips visible.
- **www.waramps.ca**
  The War Amps: How the technology of prosthetics (artificial limbs) has helped people with limb amputations.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

2 Why Does What We Eat Matter?

Information for Teachers

Dietary Reference Intake or *DRI* refers to the total daily consumption of a substance advised by health experts. This is important for interpreting nutrition information on food labels.

NOTE: For more information about DRI, visit the Health Canada website at <https://www.canada.ca/en/health-canada/services/food-nutrition/healthy-eating/dietary-reference-intakes.html>.

To function properly, the human body and brain need the following important nutrients:

Vitamins are organic substances an organism must obtain from its environment. Humans can produce some of their own vitamins (e.g., Vitamin D), but Vitamin D is made active through exposure to the Sun, so we need to supplement our Vitamin D, especially from October to March. Vitamin deficiency can cause health problems (e.g., stunted growth, fatigue, memory loss, mood swings).

Minerals are inorganic substances the intestines absorb from foods. There are two mineral types: *macrominerals* and *microminerals.* The Unlock Food website by the Dieticians of Canada has information about common vitamins and minerals, their sources, and their importance at <https://www.unlockfood.ca/en/Articles/Vitamins-and-Minerals/>.

Carbohydrates are a basic source of energy found in many foods. They are beneficial as a fuel source for the brain and provide energy to the body's cells, tissues, and organs.

Fats (or lipids) are essential for the absorption of fat-soluble vitamins (A, D, E, and K) and important fatty acids to help form nerve cell membranes. Fats can be unsaturated (liquid at room temperature) or saturated (solid at room temperature). Research shows that a diet higher in unsaturated fats and lower in saturated fats may reduce the risk of developing chronic diseases.

Cholesterol is a key part of steroid hormones and every cell membrane. It is needed for the body to produce Vitamin D. Too much cholesterol can build up in the body because of an inherited tendency or when a diet contains a high amount of saturated fat. This oversupply is stored in the blood and is a risk factor for coronary artery disease. (Children as young as age two are susceptible, but effects do not usually show up until after age 11.)

Protein is composed of amino acids and required for the structure, function, and regulation of the body's tissues and organs. Protein is beneficial to hormone and enzyme synthesis and can impact mood. Sources of protein include meats, nuts, beans, fish, and dairy products.

An *allergy* is an abnormal immune reaction to an ordinary substance, typically something found in food (such as a protein) or in the environment (such as latex). This is called an *allergen*. An allergic reaction can affect the skin, the respiratory system, the digestive system, or the cardiovascular system. The top allergens in Canada are peanuts, tree nuts (e.g., almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachio nuts, walnuts), sesame seeds, milk, eggs, fish, crustaceans and mollusks, soy, wheat and triticale, sulphites, and mustard. Children often outgrow allergies.

This lesson provides an opportunity to investigate food insecurity. Many people, including Indigenous people in northern Canada, do not have access to affordable fruits and vegetables, milk, and other fresh foods. Families living in low-income areas of urban centres may also have limited access to stores that sell fresh produce. Frozen, canned, or dried vegetables and fruits, canned fish, and shelf-stable (UHT) milk are nutritious options that may be more readily available.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

2

Treaty limits restrict where Indigenous people can hunt. Food that was common and accessible to Indigenous Peoples is more restricted and expensive to locate. Many lakes and rivers are polluted by resource companies so that fish are no longer consumable.

NOTE: Before beginning this lesson, download and print copies of the pdf *Food Guide Snapshot: Eat Well. Live Well.* This is available from Health Canada at <https://food-guide.canada.ca/en/food-guide-snapshot/>. Supplement this lesson with additional resources available from the Health Canada website.

SAFETY NOTE: This lesson provides a valuable opportunity to explore issues related to eating disorders and the portrayal of a healthy body. It is important to be aware of these issues and guide conversations as appropriate. Avoid categorizing food as "good" or "bad" as this approach may cause children to feel anxious about eating "bad" foods and can contribute to the development of an eating disorder. When discussing foods, it is best not to provide any labels and just teach facts.

Materials

- several copies of *Food Guide Snapshot: Eat Well. Live Well.*
- Image Bank: Traditional Indigenous Foods (see Appendix on page 268)
- several different cereal boxes
- projection device (optional)
- illustrated grocery-store flyers (print and online)
- food magazines (print and online)
- mural paper
- chart paper
- markers (at least six different colours)
- scissors
- resources about nutritional elements (see Action: Part Three and Action: Part Five)
- rulers (one for each pair of students)
- computers/tablets with internet access
- glue sticks
- sticky notes
- Activity Sheet: My Food Menu for One Day (1.2.1) (one for each student)
- Activity Sheet: Evaluating a Food Menu (1.2.2) (one for each student)
- Activity Sheet: Comparing Cereals (1.2.3) (one for each pair of students)
- Centimetre Graph Paper (1.2.4) (one for each pair of students)
- KWHL chart (from lesson 1)
- Science and Technology Glossary (1.1.1)

Activate

Before beginning the lesson, record each of the following six questions on a separate sheet of chart paper:

- What is one fruit you like?
- What is one vegetable you like?
- What is one snack you enjoy?
- What is one drink you enjoy?
- What is one dessert you enjoy?
- What is your favourite meal?

Display the question charts on different walls or in different areas of the classroom.

Organize the class into six groups. Give each group a different colour of marker. Assign each group a question, and have each student in the group answer the question, using the marker to record their response directly onto the sheet (students may wish to include their names in parentheses after their responses). Then, have the groups circulate and repeat until all students have responded to all questions.

As a class, review students' responses.

Introduce the guided inquiry question: **Why does what we eat matter?**

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

2

Action: Part One

Distribute copies of the document *Food Guide Snapshot: Eat Well. Live Well.* Explain that this document was developed by health experts to help Canadians make healthy food choices.

Organize the class into working groups and provide each group with chart paper and markers. Have them discuss the document and record their ideas about what the health experts are telling us. Have them develop four or five main ideas.

Once all groups have completed the task, have them share their work.

As a class, examine the various foods that are depicted in the document. Have students identify the foods that are familiar and those that they do not know or have not eaten.

Provide additional time for students to review the Food Guide website for additional information related to tips on healthy eating and recipes.

Action: Part Two

Display the Image Bank: Traditional Indigenous Foods. Discuss the various foods, and have students share prior knowledge.

Encourage students to share experiences with these foods (e.g., gathering berries, making bannock, hunting, fishing).

Now explore the recommendations in the document *Eat Well. Live Well.* Ask:

- How much of our daily food should be fruits and vegetables? (about one half)
- Why do you think we should eat lots of fruits and vegetables?
- Would a four-year-old require the same number of servings as an adult?
- How much of our daily food should be whole grains? (about one quarter)
- How much of our daily food should be proteins? (about one quarter)

Expand the discussion with the following questions:

- What foods are not included in the food guide? (e.g., highly processed foods: candy, soft drinks, potato chips)
- Why do you think these foods are not included?
- Which drink is recommended?
- Why do you think drinking water is important?

Discuss highly processed snack foods (e.g., potato chips, cookies, candy). Stress that although these types of snacks are acceptable to eat in moderation, these foods provide the human body with very little nourishment. This could result in missing out on some essential nutrients when consumed often.

Discuss food choices and responsibilities. Ask:

- Why do you think people might not eat the recommended foods even if they know about the recommendations?
- What might cause people to not make the most nutritious or balanced food choices even if they have the knowledge to make better choices? (e.g., accessibility, cost, cravings, preferences)
- Who takes responsibility for providing the food you eat at home? At school?
- Do your family or cultural traditions play a role in your food choices?
- What examples can you add to the food guide, based on your own family's choices?
- Into which group does each of these foods fit?

Discuss the diversity of fruits, vegetables, breads, and so on that reflect family traditions.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

2

Action: Part Three

Invite local Indigenous community members, Elders, or Knowledge Keepers to share knowledge about some of their traditional foods and related practices, and how this is reflected in current practice. Discussion topics could include:

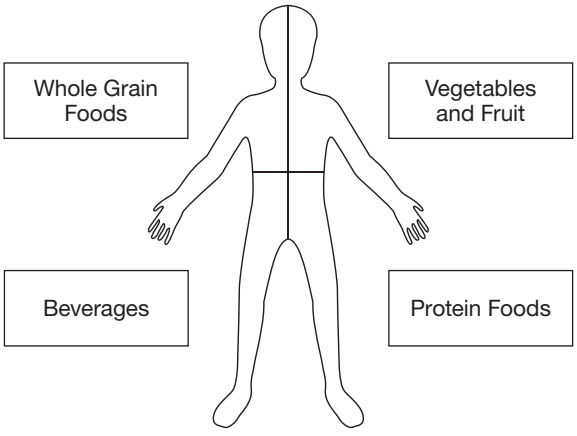
- how their people traditionally maintained good nutrition (e.g., by living off the land as hunter/gatherers) and how this might differ or remain the same now
- how wild rice has traditionally been harvested, cooked, and prepared
- what the Three Sisters are and how they have traditionally been grown, harvested, and eaten
- how maple syrup has traditionally been harvested and used
- traditional harvesting methods, as well as the types of foods eaten (e.g., blueberries, raspberries, strawberries, blackberries, cranberries, beans, corn, squash, potatoes, sunflower seeds, hickory nuts), compared to current practice
- how food was preserved and stored for long periods after having been gathered, and the various techniques for drying foods (e.g., using air, Sun, heat, smoke)
- traditional harvesting methods of animals (e.g., moose, deer, caribou, seal) and how each part of the animal is used (e.g., how the Anishinaabe tanned deer hides, how Inuit prepared sealskin for use in northern or southern climates; see "Where to Buy Sealskin!" at <www.unikkaat.com/projects/angry-inuk/where-to-buy-sealskin/>)
- how pemmican (food made of dried meat and fat, with nuts and berries often added) is traditionally made

Have students research these topics ahead of time to share with the class in preparation for the guest's visit.

NOTE: Certain protocols should be followed when inviting an Elder or Knowledge Keeper into your classroom. Consult your school board's Indigenous education leads and consultants or your local Indigenous Education Council. For example, the Lakehead District School Board has protocols available at <https://www.lakeheadschools.ca/wp-content/uploads/2021/10/Elder-Senator-Protocol.pdf>.

Action: Part Four

Organize the class into working groups, and provide each group with print and online food magazines and grocery-store flyers, mural paper, scissors, glue, and markers. Have each group trace the body outline of one member of the group and cut it out. Have students divide the body into four sections by drawing a vertical line down the centre of the outline and a horizontal line across the middle. Have students label each section (as shown below):



Ask students to cut out pictures of foods from each of the food groups from the magazines and flyers, sort the pictures, and glue them onto the

▶

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

four sections to create a collage. They may also draw illustrations of specific foods.

Have each group present their collage, and display the collages throughout the classroom.

Distribute one copy of Activity Sheet: My Food Menu for One Day (1.2.1) and Activity Sheet: Evaluating a Food Menu (1.2.2) to each student.

On Activity Sheet: My Food Menu for One Day (1.2.1) have students design a one-day menu that follows Canada's Food Guide recommendations.

On Activity Sheet: Evaluating a Food Menu (1.2.2) have students design a menu that does not completely follow the food guide. Then, have them exchange their activity sheets with a classmate. Challenge them to find the missing nutrients in each other's second menu and suggest changes so it follows the food guide more closely. Students can use the websites, prior knowledge, and new learning to complete this task.

Action: Part Five

Project or display the nutrition panels from two different cereal boxes. Focus on one nutritional element at a time, including protein, fat, carbohydrates, and familiar vitamins and minerals. Ask:

- How much protein is in each cereal?
- How is protein measured? (in grams)
- How much vitamin A is in each cereal?
- How is vitamin A measured? (in percentage of daily value)

Repeat for several of the nutritional elements. On chart paper, record all nutritional elements found on the two panels.

Now, organize the class into pairs. Have each pair select one nutritional element from the list, then record their names beside that nutritional element on the chart paper.

NOTE: More than one pair of students may compare the same nutritional element, but ensure all elements are covered.

Display a variety of different cereal boxes, and have each pair select two that include their selected nutritional element. Distribute a copy of Activity Sheet: Comparing Cereals (1.2.3) to each pair as well as Centimetre Graph Paper (1.2.4).

Provide students with rulers and resources about nutritional elements (e.g., caloric energy, protein, fat, carbohydrates, vitamins, minerals). Have students complete the activity sheet, comparing the two cereals.

NOTE: Keep the cereal boxes for analysis of marketing strategies.

Once students have completed their activity sheets, challenge each pair to find a way to graph their data on the Centimetre Graph Paper (1.2.4). As a class, co-construct criteria for construction of the graphs. For a double bar graph, for example:

- Appropriate title for the graph
- Labelled axes
- Calibrations to represent quantity
- Space between each pair of bars

NOTE: This is an opportunity to correlate science with mathematics by leaving both the graph and scale choice open. Some students may also wish to use a computer to generate graphs.

Have student pairs present their research, findings, and graph to the rest of the class. Encourage discussion that focuses on how each nutritional element is important to the human body. Discuss with students which ingredients are most important/beneficial in each cereal, and why. Challenge students to pick out three of the most nutritious cereals.

Portage & Main Press, 2025 · Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5 · ISBN: 978-1-77492-070-1

2

Assessment for Learning AfL
Observe students as they work in pairs to compare cereal. Focus on their ability to read and record nutritional data, gain information about a nutritional element through research, and construct a graph to show their data. Use the ANECDOTAL RECORD template on page 35 to record results.

STEM Makerspace

- In addition to the materials at the Makerspace, provide graph paper, wax paper, drawing paper, rolling pin, scissors, timer, kitchen scale, regular potato chips, and reduced-fat potato chips.
- Challenge students to conduct the Spot the Fat in Your Snack experiment found on the Science Buddies website at <https://www.sciencebuddies.org/stem-activities/spot-the-fat-in-your-snack>. In this investigation students will make fats visible by using a grease spot test and taking measurements.
- Have students recreate the experiment to observe and record the amount of visible fat in other snack foods of their choice.

Coding Connections

NOTE: For more information about coding, see "What Is Coding?" in the Introduction on page 4.

PLUGGED: Indigenous Cooking with a Dash of AI

- Provide students with tablets, computers, or Chromebooks. Access the Predict a Pie with a Neural Network lesson and activity at the Indigenous Cooking with a Dash of AI website: <https://nn.inventor.city/>.
- Have students watch the Educational and Tutorial video, which provides an overview of AI and machine learning, along with a concrete example of how bias can affect AI models. Students will learn the importance of gathering data from various sources and perspectives, and they will learn about what factors to consider to improve AI models (in this case, a recipe-generating AI model).
- Next, have students test a pre-trained AI model including the improved model created by Indigenous chef David Wolfman. Then, challenge students to build and test their own AI neural network to generate recipes.

Talking Circle

Revisit the guided inquiry question: **Why does what we eat matter?** Have students share their knowledge, provide examples, and ask further inquiry questions.

Consolidate and Debrief

- Have students add to the KWHL chart created in lesson 1 as they learn new concepts, answer some of their own inquiry questions, and ask new inquiry questions.
- Add new vocabulary and corresponding illustrations to the word wall. Include the words in languages other than English, as appropriate.
- Have students add new vocabulary, illustrations, and sentences to their Science and Technology Glossary (1.1.1). When possible, encourage students to add the words in languages other than English, including Indigenous languages, reflective of the classroom community.

Enhance

- **Family Connection:** Provide students with the following sentence starters:
  - Some of our favourite family foods are _____.
  - One of our favourite recipes is _____.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Have students record the sentence starters in their Science and Technology Journal or agenda and complete it at home. Family members can help students draw and write about this topic. Have students share their completed sentences with the class.

- Have students research online for local edible plants. Some websites they could explore include:
  - The Urban Farmer's Edible Plants for the Prairies <www.theurbanfarmer.ca/edible-plants-for-the-prairies>
  - Northern Bushcraft's Wild Edible Plants of Ontario <https://northernbushcraft.com/guide.php?ctgy=edible_plants&region=on>

  Have students use information from their research to create field guides that include plant names, descriptions, illustrations, and suggestions for use.

NOTE: Remind students that they should never eat a plant or its parts without first asking an adult.

- Research the importance of food to traditional gatherings and celebrations (e.g., Haudenosaunee Strawberry Ceremony, Ramadan fast and feast, Christmas meals around the world, Hanukkah celebrations).
- Read a variety of books about foods more commonly and/or traditionally eaten by various Indigenous Peoples. For example:
  - *The Three Sisters* by Michelle Corneau
  - *Lessons From Mother Earth* by Elaine McLeod
  - *Wild Berries* by Julie Flett
  - *Ziis-baak-daa-keng Maple Syrup Harvesting* by Lucy Pitawanakwat and Honourine Trudeau-Wright

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Download these reproducibles at <https://www.portageandmainpress.com/isbn/9781774920701>. For step-by-step instructions to access this download, see Appendix on page 267.

1.2.1

Date: _____ **Name:** _____

My Food Menu for One Day

Meal	Food Item	Quantity	Food Group
breakfast			
lunch			
supper			
snacks			

Total Number of Servings:

- whole grain foods _____
- vegetables and fruit _____
- protein foods _____

1.2.1

Portage & Main Press, 2025 · Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5 · ISBN: 978-1-77492-070-1

1.2.2

Date: _____ **Name:** _____

Evaluating a Food Menu

Menu Planner: _____

Menu Evaluator: _____

Meal	Food Item	Quantity	Evaluator's Changes
breakfast			
lunch			
supper			
snacks			

Explain how you improved the menu.

_____

_____

_____

1.2.2

Portage & Main Press, 2025 · Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5 · ISBN: 978-1-77492-070-1

1.2.3

Date: _____ **Name:** _____

Comparing Cereals

1. We are comparing _____ content in cereals.
2. This nutritional element is important because _____

   _____

   _____

   _____
3. Make a chart to record your information. On the chart, list the names of the two cereals, the serving sizes, and the amount of this nutritional element in each cereal.
4. Other foods that contain _____ are:

   _____

   _____
5. Which of the two cereals do you think is the most nutritious? Explain your answer.

   _____

   _____

   _____

   _____

1.2.3

Portage & Main Press, 2025 · Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5 · ISBN: 978-1-77492-070-1

1.2.4

Date: _____ **Name:** _____

Centimetre Graph Paper

1.2.4

Portage & Main Press, 2025 · Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5 · ISBN: 978-1-77492-070-1

Appendix: Image Banks

Images in this appendix are thumbnails from the Image Banks referenced in the lessons.

Corresponding full-page, high-resolution images can be printed or projected for the related lessons. Download the digital resources for this book, including the image banks and reproducibles, using the instructions below. You may return to this link to download the desired files until a new edition is available for pre-order.

1. Go to the Portage & Main Press website at <https://www.portageandmainpress.com/isbn/9781774920701>.

NOTE: The angle brackets (< and >) are not part of the above URL.

2. On the product page, select the button labelled Download Digital Resources. A new page will appear, requesting a password.
3. Type the password XXXXXXX into the password field. The password is case sensitive, so be sure to use the correct capitalization.
4. Select Submit. A new page will appear, listing the download options for this book.
5. Click Retrieve Your Download to download the digital resources, including the image banks and reproducibles for this book.
6. Save the file to the desired location on your computer.

NOTE: This is a large file. Download times will vary due to your internet speeds.

Lesson 2: Why Does What We Eat Matter?

Traditional Indigenous Foods



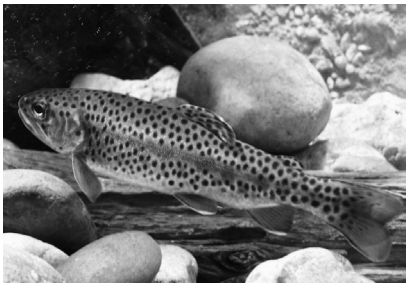
1. Strawberries



2. Bannock



3. Cooked Wild Rice



4. Rainbow Trout



5. Bull Moose



6. Roasted Squash and Sweet Potatoes



7. Collecting Maple Sap



8. White-Tailed Deer

Image Credits:

1 – "Carlsbad Strawberry Co." BY Flickr user Rob Bertholf. Used under CC by 2.0 licence.

2 – "Bannock" by Nicholas (wzdd). Used under CC BY 2.0 licence.

3 – "Wild Rice - Fabulous Christmas brunch at La Petite France - 8" by Roland Tanglao. Used under Public Domain licence.

4 – "Rainbow trout yearling (Oncorhynchus mykiss)" by Robert Pos. Used under CC BY 2.0 licence.

5 – "Bull Moose" by Denali National Park and Preserve. Used under Public Domain licence.

6 – "Roasted Veggies" by Flickr user Vanessa Druckman. Used under CC BY 2.0 licence.

7 – "Collecting Sap" by Flickr user Paul VanDerWerf. Used under CC BY 2.0 licence.

8 – "Deer" by Noël Zia Lee. Used under CC BY 2.0 licence.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario · Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

About the Contributors

Jennifer E. Lawson, PhD, is the creator of the Hands-On series published by Portage & Main Press. As senior writer and editor for the series, she has contributed to more than 50 publications for teachers and students. Jennifer provides professional development workshops for educators locally, nationally, and virtually, and is a Workplace Wellness Advisor. Her most recent book is a collective effort called *Teacher, Take Care: A Guide to Well-Being and Workplace Wellness for Educators*. She is also one of the founders of Mission to Mexico, an organization that supports schools in some of the most impoverished communities in Puerto Vallarta, Mexico. Throughout her extensive career in education, Jennifer has worked as a classroom teacher, resource and special education teacher, consultant, principal, university instructor, and school trustee. She lives with her family in Winnipeg, Manitoba.

Kellie Ierullo (she/her/hers) has been an educator with the Toronto District School Board for over 20 years, including as a classroom teacher, special education teacher, and now as a teacher-librarian, technology chair, and science/STEM lead educator. Kellie is passionate about helping teachers engage students through meaningful coding and STEM activities and encouraging students to move beyond navigating technology to creating it for themselves. Kellie lives in Woodbridge, Ontario, with her family.

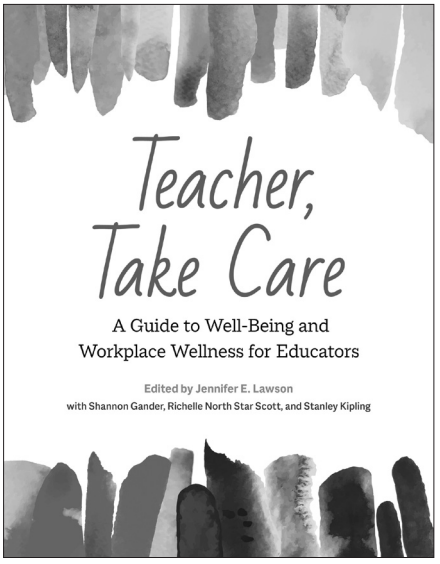
Jennifer H. Manitowabi (she/her/hers) is an Ojibway educator and PhD candidate at Lakehead University. Throughout her career in education in both Canada and the United States, she has worked as a bus driver, classroom teacher, principal, and education director. Jennifer encourages all educators to incorporate Indigenous worldviews in their teaching and to find opportunities to build relationships with the First Nations of Turtle Island. Jennifer is a member of Lac Seul First Nation, where she currently resides, and can often be found creating artwork that celebrates her culture.

Portage & Main Press, 2025 · *Hands-On Science and Technology for Ontario* · *Hands-On Science and Technology for Ontario, Grade 5* · ISBN: 978-1-77492-070-1

Teacher, Take Care

Because great teaching starts with you!

From **Jennifer E. Lawson**



9781774920299

Get your copy today!

Available at local bookstores, online retailers, and educational resource centres.

www.portageandmainpress.com

An essential guide to well-being and workplace wellness, by teachers for teachers.

Educators, your well-being is crucial for your success and the success of your students. *Teacher, Take Care* is designed to help you thrive in the classroom and beyond. Discover practical strategies and tips to enhance your physical, mental, and emotional health.

Inside this guide:

- **Self-care strategies:** Practical tips to recharge and stay balanced
- **Stress management:** Techniques to handle classroom pressures with ease
- **Healthy habits:** Simple changes for better nutrition, exercise, and sleep
- **Work-life balance:** Effective ways to manage your professional and personal life
- **Mindfulness & resilience:** Build mental strength and stay motivated
- **Indigenous perspectives:** Connect to Indigenous perspectives of wellness through remarks from Elder Stanley Kipling and Knowledge Keeper Richelle North Star Scott

PORTAGE & MAIN PRESS