



STAGE 2

GRADE 4: MACHINES AND PIZZA

In this stage, Grade 4 students will learn about the impact of machines on society and the environment, explain the parts of a food chain and create a pizza food chain

that includes producers. Students will get a chance to apply the engineering design process to design, build, test, and modify a water well, grain grinder, and a food chain.

Stage 2 Grade 4: Machines and Pizza

Overview

Supporting Grade 4 Students in Combined Grade 4/5 STEMterprise Classrooms. Most of the STEMterprise lessons that address science expectations and build STEM skills found in Strand A of the Ontario Science Curriculum can be used as-is in a combined Grade 4/5 classroom. However, in Stage 2, the expectations vary quite a bit between Grade 4 Science and Grade 5 Life Systems: Human Health and Body Systems.

To help make planning easier, we've developed a few optional learning opportunities designed especially for Grade 4 students. These activities connect to the Pizza Shop Project and link directly to the Grade 4 Science expectations from Strand D Structures and Mechanisms.

Teachers know their students best—feel free to adapt these ideas or use your own approaches to meet your learners' needs. You'll also find alternate science lesson suggestions at the end if you prefer a different direction.

Learning Goals Needed

Students will:

- Understand the impact of machines on society and the environment
- Explain the parts of a food chain and create a pizza food chain that includes producers
- Apply the engineering design process to design, build, test, and modify a water well, grain grinder, and a food chain
- Communicate their choices, results, and conclusion for their STEM challenge
- Work independently while being productive, responsible, and respectful of their classmates

Materials Needed

- [Stage 2 Gr 4 Teaching Slides](#)
- [Stage 2 Gr 4 Active Viewing KWL and Questions](#)
- [Stage 2 Gr 4 The Future of Pizza](#)
- [Stage 2 Gr 4 The Future of Pizza](#) (pdf)
- [Stage 2 Gr 4 Rubric and Self Assessment](#)
- [Stage 2 Gr 4 Machine STEM Challenges](#)
- [Stage 2 Gr 4 Ozobot Pizza Food Chain Grid](#)
- [Stage 2 Gr 4 Ozobot Lesson Plan: Energy Food Chain](#) (pdf)
- [Stage 2 Gr 4 Ozobot Lesson Plan: Energy Food Chain - Student](#) (pdf)
- [Stage 2 Gr 4 Ozobot Lesson Plan: Energy Food Chain - Student Solution](#) (pdf)

Teachers' Notes

The following activities are optional learning opportunities for your Grade 4 students to explore during Stage 2 of the STEMterprise Pizza Shop Project. These activities can be completed independently, with a partner, or in small groups.

This stage includes:

- **Minds-On** – Students make early connections between the topics of simple machines and farm equipment through active viewing of 2 videos. Consider using a KWL chart for this stage. Note that the active viewing doc includes activities for videos on slides 8, 9, 10 and 12 that relate to Challenges 1, 2, and 3.
- **The Future of Pizza Article:** Read and answer questions about modern food innovation

- Machine Challenge 1: Student need to design a well water system for grain and pizza ingredient plants
- Machine Challenge 2: Students design a simple machine gear system to grind wheat into flour
- Machine Challenge 3: Students explore food chains and a pizza delivery path using Ozobots
- Machine Challenge 4: TVO Learn Green Iglu/Food for Thought lesson that explores food, climates and growing foods in the Arctic.
- Additional Resource Suggestions – Other learning opportunities and extensions

The STEM Challenges are on the [Stage 2 Gr 4 Machine STEM Challenges](#) doc and can be accessed online or printed. These activities were developed and adapted from ideas from Let's Talk Science, SciTech Ontario, Science North, TVO Learn and original content.



Idea! When teaching combined grades, many educators start with a shared topic and then give each grade a different task or challenge. This is one of the strategies recommended in this [Ontario curriculum resource](#) and works very well in this stage.

Time: *This requires more than one period.*

Coding Connection

There is an optional Coding Connection at the end of this and all lesson slides and the [Coding Connections Slides](#) can be found at this link. Coding: Sunlight Sensor

Curriculum Expectations

D. Structures and Mechanism - Machines and Their Mechanisms

D1. Relating Science and Technology to Our Changing World - evaluate the impacts of various machines and their mechanisms on society and the environment

D2. Exploring and Understanding Concepts - demonstrate an understanding of the basic principles and functions of machines and their mechanisms

C. Matter and Energy - Light and Sound (optional coding lesson - see slide 17)

C2. Exploring and Understanding Concepts - demonstrate and understanding of light and sound as forms of energy that have specific characteristics and properties

STEMterprise References for Educators

STEMterprise Webpage: <https://goodineverygrain.ca/ontario-farming-stemterprise/>

Video Links

- [Ontario Farming STEMterprise: Grade 5 Pizza Shop Business](#)
- [Students: Are you ready for your own pizza business?](#)

STEMterprise Teacher Support Resources

- [Ontario Farming Grade 5 Educator Information Packet](#)
- [STEMterprise Grade 5 Assessment Planning](#)
- [Project Overview](#)
- [Combined Grade Activities](#)
- [Career Connections Slides](#)
- [Coding Connections Slides](#)
- [Good in Every Classroom Education Blog](#)
- [Good in Every Classroom Newsletter Sign-Up](#)

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Slide 7: Minds On!	To encourage active listening/viewing, have the students note the examples of the simple machines from videos 1 and 2 using this Stage 2 Gr 4 Active Viewing KWL and Questions as a guide. If you would like to have students first do a reflection of what they Know and Want to know about this topic, a simple machine KWL chart is on page 1. Note: The following videos are also included on the active viewing document and video links can be found on the subsequent teaching slides to follow. Video 1: Slide 6 - Finding out Stuff - Machines - watch from 14:25 Video 2: Slide 6 - Ask a Farmer: What is an auger? (1:17) Video 3: Slide 8 - Science Max - Simple Machines - Full Episode, Pulleys (12:44 - 13:25). Video 4: Slide 9 - Science North: Gears - For Teachers (3:50). Video 5: Slide 10 - The Story of Flour- Dig In! (2:02). Video 6: Slide 10 - 1958 Gears And Where They Fit In - Crabble Mill Water Mill (5:25). Video 7: Slide 12 - Food Chains and Food Webs - Science Lesson (3:03).
Slide 8: Intro - The Future of Pizza	Have students share what they think innovation means. This definition and example might be helpful - <i>Innovation is coming up with new ideas, new ways of doing things, or creating new devices to solve a problem or make something better. It's about being creative and finding clever solutions, like inventing the wheel and then using that invention to make a bicycle or a car.</i> Have students read the Future of Pizza article (PDF version, Online, on doc with questions) with a focus on the innovative machines in the article. Discuss the impact it would have on a business, people and the environment. This Stage 2 Gr 4 The Future of Pizza doc can be used to record responses to the questions.
Slide 9: Machine Challenge 1: Pizza Pulley	Science Max Video - Simple Machines Video - For the section about pulleys begin at 12:50-15:00 - Use this Stage 2 Gr 4 Active Viewing KWL and Questions doc for the students to engage while watching the videos in this stage.

Power	Go to the Stage 2 Gr 4 Machine STEM Challenges doc for the challenge details. Pulley system resources: Kid Museum video <i>Image: Google Gemini</i> Note: The following videos are also included on the active viewing document and video links can be found on the subsequent teaching slides to follow. Video 1: Slide 6 - Finding out Stuff - Machines - watch from 14:25 Video 2: Slide 6 - Ask a Farmer: What is an auger? (1:17) Video 3: Slide 8 - Science Max - Simple Machines - Full Episode, Pulleys (12:44 - 13:25). Video 4: Slide 9 - Science North: Gears - For Teachers (3:50). Video 5: Slide 10 - The Story of Flour- Dig In! (2:02). Video 6: Slide 10 - 1958 Gears And Where They Fit In - Crabble Mill Water Mill (5:25). Video 7: Slide 12 - Food Chains and Food Webs - Science Lesson (3:03).
Slide 10: Machine Challenge 2: About Gears and Grains	Have students watch the gears video and consider the two thinking questions. Use the Stage 2 Gr 4 Active Viewing KWL and Questions for the students to engage while watching the videos in this stage. After watching the video, have the students explore and create gears using the gearsketch site. Gears can also be made with Knex (if available) and cardboard (see this sample 4H cardboard gears instructions) This Science North lesson about Making an Elevator references the program Gearsketch and gives sample instructions for using the tool. See this Science North GearSketch Challenge for reference. Note: The following videos are also included on the active viewing document and video links can be found on the subsequent teaching slides to follow. Video 1: Slide 6 - Finding out Stuff - Machines - watch from 14:25 Video 2: Slide 6 - Ask a Farmer: What is an auger? (1:17) Video 3: Slide 8 - Science Max - Simple Machines - Full Episode, Pulleys (12:44 - 13:25). Video 4: Slide 9 - Science North: Gears - For Teachers (3:50). Video 5: Slide 10 - The Story of Flour- Dig In! (2:02). Video 6: Slide 10 - 1958 Gears And Where They Fit In - Crabble Mill Water Mill (5:25). Video 7: Slide 12 - Food Chains and Food Webs - Science Lesson (3:03)

Slide 11: Machine Challenge 2: About Gears and Grains	Watch the videos - Use the Stage 2 Gr 4 Active Viewing KWL and Questions for the students to engage while watching the videos in this stage. There are alternate videos to the left of the slide if you are looking for additional sources. Note: The following videos are also included on the active viewing document and video links can be found on the subsequent teaching slides to follow. Video 1: Slide 6 - Finding out Stuff - Machines - watch from 14:25 Video 2: Slide 6 - Ask a Farmer: What is an auger? (1:17) Video 3: Slide 8 - Science Max - Simple Machines - Full Episode, Pulleys (12:44 - 13:25). Video 4: Slide 9 - Science North: Gears - For Teachers (3:50). Video 5: Slide 10 - The Story of Flour- Dig In! (2:02). Video 6: Slide 10 - 1958 Gears And Where They Fit In - Crabble Mill Water Mill (5:25). Video 7: Slide 12 - Food Chains and Food Webs - Science Lesson (3:03).
Slide 12: Machine Challenge 2: About Gears and Grains	This STEM challenge can be approached in ways that best suit your students. If you have access to K'nex, they would be ideal for the students to build with. Alternatively, students can use cardboard to create gears. The challenge can be open, allowing the students to plan, design and create their mill with their original ideas. Students can create a flour mill using K'nex instructions or images to follow or for inspiration. See the images and links to the right of this slide. After reviewing the challenge, go to the Stage 2 Gr 4 Machine STEM Challenges doc for the challenge details. If using cardboard rather than K'nex to make the gears, see this link for a gear template, and these instructions for making cardboard gears. <i>Image: Google Gemini</i>
Slide 13: Machine Challenge 3: Ozobot Food	Have students watch the Food Chains and Food Webs video and note the differences between a chain and a web. To encourage active viewing, have the students use the 3, 2, 1 strategy on the Stage 2 Gr 4 Active Viewing KWL and Questions doc.

Chain Challenge

Look at the pizza food chain and discuss what might be missing. (sunlight, a decomposer). The **human** is a consumer who benefits from all these connected food chains by eating the final product, the pizza. The energy that started from the **Sun** and was captured by the **wheat plant** (the grain) moves up through the different steps to the person eating the crust.

Sun → Wheat Plant (Grain) → Human (eats crust) → Decomposer

Sun → Grass → Cow → Cheese → Human → Decomposer

Sun → Corn/Grains → Pig → Pepperoni → Human → Decomposer

Food chain image: Gemini

Note: The following videos are also included on the active viewing document and video links can be found on the subsequent teaching slides to follow.

Video 1: Slide 6 - [Finding out Stuff - Machines](#) - watch from 14:25

Video 2: Slide 6 - [Ask a Farmer: What is an auger?](#) (1:17)

Video 3: Slide 8 - [Science Max - Simple Machines - Full Episode, Pulleys](#) (12:44 - 13:25).

Video 4: Slide 9 - [Science North: Gears - For Teachers](#) (3:50).

Video 5: Slide 10 - [The Story of Flour- Dig In!](#) (2:02).

Video 6: Slide 10 - [1958 Gears And Where They Fit In - Crabble Mill Water Mill](#) (5:25).

Video 7: Slide 12 - [Food Chains and Food Webs - Science Lesson](#) (3:03).

Slide 14: Machine Challenge 3: Ozobot Food Chain Challenge

Remind students of what to include in a Pizza food chain. Review the Ozobot [Colour Code Guide](#). If your students are new to the Ozobot, after reviewing this resource with tips and command instructions, allow time for them to experiment with GOOS paper and the Ozobots before creating their Ozobot Pizza Chain.

You might also choose to have the students complete this [Food Chain activity](#) first from the Ozobot website using this [Stage 2 Gr 4 Ozobot Lesson Plan: Energy Food Chain - Student](#) PDF and [Stage 2 Gr 4 Ozobot Lesson Plan: Energy Food Chain - Student Solution](#) sheet, then create their own food chain on the [Stage 2 Gr 4 Ozobot Pizza Food Chain Grid](#).

Have the [colour codes chart](#) available when they are creating their own pizza path.

This challenge is on the [Stage 2 Gr 4 Machine STEM Challenges](#) doc.

	<i>Image: Gemini</i>
Slide 15: Machine Challenge 4: TVO Learn - Green Iglu/Food for Thought	Go to the Green Iglu/Food for Thought lesson at TVO Learn and follow the 3 part lesson about food, growing seasons and innovative agriculture in Canada.
Slide 16: Reflection and Assessment	Provide students with the Stage 2 Gr 4 Rubric and Self Assessment comprised of a Single Point Rubric and STEM challenge self assessment as their exit tickets
Slide 17: Additional Resources	The following links provide extensions and additional learning resources. • Coding - Use a Microbit to code a Sunlight Sensor. See the Coding Connections light lesson and slides 18 and 19 • STAO - Science Teachers' Association of Ontario • TVO Learn - Coding Food Chain Frenzy, and Food Chains lesson, Mighty Machines lesson • Science North • Ontario Curriculum - Science Long-Range Plans • Let's Talk Science - STEM Resources and Lessons
Slide 18-20: Coding Connections	Sunlight Sensor: The lesson can be done as a compliment to seed planting or anytime when talking about farming and ingredients. - Open with a discussion about why sunlight is important for plants. See points below that relate Discuss Micro:Bit task of making a Sunlight Sensor Notes: Relating to the Ontario Science Curriculum - Life Systems: Interactions in the Environment strand, sunlight is important for plants because it's their main source of energy for making food. Photosynthesis involves water, carbon dioxide and energy from the sun. Sun helps plants grow, stay healthy, make flower/fruit

Slide 21:
What's Next?

The “What’s Next?” slide is intended to be flexible and may be customized or filled in by teachers based on their classroom needs, pacing, and next steps.