



STAGE 2

GRADE 6: FLIGHT

In this stage, Grade 6 students will learn about the impact of flight on society and explain the effects of the four forces of flight (lift, drag, thrust, and weight) on our airplane or drone. Students will get a chance to apply the engineering design process to design, build, test, and modify a flying machine for pizza delivery.

Stage 2 Grade 6: Flight

Overview

Supporting Grade 6 Students in Combined Grade 5/6 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 5/6 classroom. However, in Stage 2, the expectations vary quite a bit between Grade 5 Life Systems: Human Health and Body Systems and Grade 6 Science.

To help make planning easier, we've developed a few optional learning opportunities designed especially for Grade 6 students. These activities connect to the Pizza Project and link directly to the Grade 6 Science expectations on flight and energy.

Teachers know their students best—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.

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Learning Goals Needed

Students will:

- Understand the forces of flight and explain the effects of the four forces of flight (lift, drag, thrust, and weight) on our airplane or drone
- Apply the engineering design process to design, build, test, and modify a flying machine for pizza delivery
- 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 6 Teaching Slides](#)
- [Stage 2 Gr 6 The Ultimate Pizza Delivery KWL & Questions](#)
- [Stage 2 Gr 6 The Ultimate Pizza Delivery](#) (pdf)
- [Stage 2 Gr 6 Flight STEM Challenges](#)
- [Stage 2 Gr 6 Active Viewing Questions](#)
- [Stage 2 Gr 6 Rubric and Self Assessment](#)
- 10 Airplane Designs (pdf). Students can choose from these designs for their STEM Challenge.
 - [Airplane Design: Sea Glider](#) (pdf)
 - [Airplane Design: King Bee](#) (pdf)
 - [Airplane Design: Staple Easy](#) (pdf)
 - [Airplane Design: LTS Paper Instructions](#) (pdf)
 - [Airplane Design: Jet Fighter](#) (pdf)
 - [Airplane Design: Tailed Plane](#) (pdf)
 - [Airplane Design: Basic Dart](#) (pdf)
 - [Airplane Design: Lock Bottom](#) (pdf)
 - [Airplane Design: Royal Wind](#) (pdf)
 - [Airplane Design: Star Flight](#) (pdf)

Teachers' Notes

The following activities are optional learning opportunities for your Grade 6 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:

- The Ultimate Pizza Delivery Article – Students make early connections between the topics of *flight* and *pizza delivery*, and create a KWL chart for this stage using the [Stage 2 Gr 6 The Ultimate Pizza Delivery KWL & Questions](#) doc
- Minds On - Students discover drone operators using [Agscape Career Profile: Drone operator](#) from the Stage 3, Lesson 3 [Career Connections slides](#).
- About flight and drones
- Flight Challenge 1: Students need to design a parachute that will delivery pizza
- Flight Challenge 2: Students need to design a plane out of paper that will delivery pizza (*simpler*) **design templates available in slide speaking notes.*
- Flight Challenge 3: Students will need to design a drone that will deliver pizza
- Flight Challenge 4: Students will need to improve the design of a model rotor system so that it can stay in the air the longest (*simpler*)
- Flight Challenge 5: Students follow the 3 part lesson from TVO Learn on Tech Support.
- Additional Resource Suggestions – Other learning opportunities and extensions

The STEM Challenges are on [Stage 2 Gr 6 Flight STEM Challenges](#) 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.*

Curriculum Expectations

D. Structures and Mechanism - Flight

D2. Exploring and Understanding Concepts - demonstrate and understanding of the ways in which properties of air can be applied to the principles of flight and flying machines

D2.1 identify flight-related applications of the properties of air

D2.2 describe the relationships between the four forces of flight – lift, weight,

thrust, and drag – that make flight possible

D2.3 describe ways in which flying machines and various organisms use balanced and unbalanced forces to control their flight

D2.4 describe ways in which the four forces of flight can be altered

D2.5 describe characteristics and adaptations that enable organisms to fly

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](#)

Stage 2 | Grade 4: Machines and Pizza

Slide 7: Intro - The Future of Pizza	Have students read the article, Stage 2 Gr 6 The Ultimate Pizza Delivery (pdf) and create a KWL and respond to the questions found in the Stage 2 Gr 6 The Ultimate Pizza Delivery KWL & Questions doc. Link to the online article.
Slide 8: Minds On! Drone operator	Have students visit the AgScape career profile: Drone operator to learn more about how drones are a part of agriculture. This Minds On is from the Career Connections slides and is suggested as an extension in Stage 3 Lesson 2. Grade 5/6 teachers could have grade 6 students present their learning about how drones are used for agriculture and crops to the grade 5s in Stage 3 during the Tech on Farms lessons. <i>Bill Gates quote image: Google Gemini</i>
Slide 9: Let's Learn About Flight	Review vocabulary and have students watch one or both of the videos. Video 1: Flight for the Classroom from Science North (6:38) Video 2: Message on a Glider: The Science of Flight (10:06) To encourage active viewing of the video on the left, have the students listen to the opposing forces of thrust, lift, drag and weight as well as the question, “What do airplanes have that humans don’t that creates lift and thrust?” (answer - wings and an engine). For the second video on the right, encourage active viewing by asking the students to identify what examples demonstrate the forces of flight (weight, lift, thrust and drag). As well, ask what is the message about failure and what do they think it means when the video ends with the words “ask, test, repeat”. This Stage 2 Gr 6 Active Viewing Questions doc can be printed for students to document their responses to the videos.
Slide 10: Flight Challenge 1: Pizza Delivery Parachute	The materials needed for this activity are: ☐ A small container with a few weights such as coins to simulate a pizza box ☐ A drop zone such as a hula hoop or taped square on the floor ☐ Plastic bags ☐ String

	☐ Tape ☐ Paper clips ☐ Cardboard ☐ Any other materials that may be helpful. <i>Image: Google Gemini</i>
Slide 11: Flight Challenge 2: Pizza Delivery Paper Airplane	The materials needed for this activity are: ☐ Sheets of paper (ideally GOOS paper) ☐ Scissors ☐ Rulers ☐ Tape ☐ Printed copies of paper airplane instructions from the FoldnFly website or downloaded from the list below: ☐ 10 Airplane Designs (pdf). Students can choose from these designs for their STEM Challenge. ☐ Airplane Design: Sea Glider (pdf) ☐ Airplane Design: King Bee (pdf) ☐ Airplane Design: Staple Easy (pdf) ☐ Airplane Design: LTS Paper Instructions (pdf) ☐ Airplane Design: Jet Fighter (pdf) ☐ Airplane Design: Tailed Plane (pdf) ☐ Airplane Design: Basic Dart (pdf) ☐ Airplane Design: Lock Bottom (pdf) ☐ Airplane Design: Royal Wind (pdf) ☐ Airplane Design: Star Flight (pdf) Answers for teachers to student questions in the test and evaluate: When students pick up one of your airplanes. Ask - What forces are acting on it? Gravity is pulling it down - we call this force the weight. Is there a force when you throw it? Yes - this is called thrust. If your airplane had an engine, would the thrust continue? (yes - but in our case thrust is only applied before the plane is released) Throw the airplane and watch it fly. The airplane slows down. Why? (Air friction) So there is another force - we call it drag. Does the airplane hit the floor as rapidly as if you just let it drop? (Try out - no!). So there must be a force keeping the airplane up against gravity. Though gravity wins, without this force it would hit the floor really fast. This is called lift.
Slide 12:	Have students watch the drone videos.

Let's Learn About Drones	Video 3: Drones for Good (2:34) Video 4: The History of Drones (7:47) To engage students in active listening while watching the video, consider using one of these strategies: 3, 2 1 - students note 3 things they learned, 2 questions they have and 1 connection they made, students summarize the video, or students write a question for a classmate. This Stage 2 Gr 6 Active Viewing Questions doc can be printed for students to document their responses to the videos. https://letstalkscience.ca/educational-resources/stem-explained/its-a-bird-its-a-plane-its-a-drone
Slide 13: Flight Challenge 3: Pizza Delivery Drone	The materials needed for this activity are: ☐ A small object to simulate a pizza box ☐ Cardboard ☐ Straws ☐ Tape ☐ Paper ☐ Pipe cleaners ☐ Small weights ☐ Paper for planning ☐ Any other materials considered helpful. <i>Image: Google Gemini</i>
Slide 14: Flight Challenge 4: Delivery Drone Rotor Improvement	The materials needed for this activity are: ☐ Boxboard/cardstock ☐ Scissors ☐ Tape ☐ Ruler ☐ Pencil ☐ Cylindrical item for a rotor (straw, pencil, skewer, rolled paper) ☐ Timer ☐ Rotor template found on page 10 of the Stage 2 Gr 6 Flight STEM Challenges doc. Lesson adapted from LTS How could you improve a rotor design. Alternate Lesson suggestion linked to drone image from TVO Learn - Drone Technology: Help or Hindrance?

Slide 15: Flight Challenge 5: TVO Learn - Tech Support	Go to the Tech Support for Climate Change and Biodiversity lesson at TVO learn and follow the 3 part lesson relating to drones.
Slide 16: Reflection and Assessment	Provide students with the Stage 2 Gr 6 Rubric and Self Assessment composed 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. • Career Trading Cards related to Flight from Let's Talk Science - LTS teacher resource • Coding - Canada Takes Flight from Canada Learning Code • STAO - Science Teachers' Association of Ontario • TVO Learn - Gr 6 lessons - TVO Learn - Drone Technology: Help or Hindrance? • Science North • Ontario Curriculum - Science Long-Range Plans • Let's Talk Science - STEM Resources and Lessons
Slide 18: 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.