

## 8b.8 Analyzing a System: Independent Project

### Story Extension for This Lesson:

As Sam and Alex travel through the Great Lakes, they are awed by the beauty that they encounter, and yet also worry about the growing threat to the environment. They come to realize that the Earth is a huge, open system, with energy constantly being provided from the Sun, and energy also escaping back into space. Are human behaviours influencing this system? Are smaller systems on the Earth being affected by larger changes, such as to our atmosphere? These are questions they begin to ponder as they paddle along.

**Grade: 8**

**Strand: Systems in Action**

### Big Ideas:

- Systems are designed to accomplish tasks. (Overall expectations 1, 2, and 3)
- All systems include an input and an output. (Overall expectations 2 and 3)
- Systems are designed to optimize human and natural resources. (Overall expectations 1 and 3)

### Overall Expectations:

1. assess the personal, social, and/or environmental impacts of a system, and evaluate improvements to a system and/or alternative ways of meeting the same needs
2. investigate a working system and the ways in which components of the system contribute to its desired function
3. demonstrate an understanding of different types of systems and the factors that contribute to their safe and efficient operation

### Specific Expectations:

- 1.2 assess the impact on individuals, society, and the environment of alternative ways of meeting needs that are currently met by existing systems, taking different points of view into consideration
- 2.6 use appropriate science and technology vocabulary, including mechanical advantage, input, output, friction, gravity, forces, and efficiency, in oral and written communication
- 2.7 use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes
- 3.1 identify various types of systems (e.g., mechanical systems, body systems, optical systems, mass transit systems, Aboriginal clan systems, health care systems)
- 3.2 identify the purpose, inputs, and outputs of various systems (e.g., a garden, purpose: to grow things; input: seeds, water, fertilizer; output: flowers, food)
- 3.3 identify the various processes and components of a system (e.g., robot, front-end loader/backhoe, heating system, transportation system, health

care system) that allow it to perform its function efficiently and safely  
3.9 identify social factors that influence the evolution of a system

### **Inquiry Skills:**

Questioning, Gathering Data, Evaluating, Reporting

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### **Instructions:**

Throughout this unit, students have been looking at the structure and function of different systems, and using the Habits of Systems Thinking to analyze the systems. In this summative task, they will apply their skills to a problem of their choice.

#### **Part 1:**

When looking at large problems in our world, it is sometimes easy for students to become frustrated, and maybe even alarmed. In this activity, encourage students to view problems as possibilities that are awaiting innovative solutions.

To start, have students watch the TED talk by Michael Pawlyn entitled Using Nature's Genius in Architecture:

- TED Talk: <https://www.ted.com/talks/michaelpawlynusingnaturesgeniusinarchitecture?language=en>

This is an inspiring and fascinating look at how new technologies, inspired by nature, are helping to solve some pretty big problems in the world.

#### **Part 2:**

Students are to brainstorm and then choose a specific system of interest to them, and then analyze the system using Systems Thinking. Encourage students to think big, and identify a system to study that is of importance to their community or a broader constituency such as their province, country or beyond.

As an example, students might research the Oak Ridges Moraine from a systems perspective looking at inputs, processes, and outputs, and then using Systems Thinking to decide whether they think building on the Moraine should be allowed, and consequences of doing so.

- Oak Ridges Moraine resource: <http://www.oakridgesmoraine.org/>

Encourage students to look at creative solutions to problems, and focus on problems as possibilities for innovation.

NOTE: In order to develop good ideas and to give students time to uncover possibilities, it is highly recommended that this end task be introduced at the start of the unit. This can enable students to constantly search for ideas, and also to help them understand where they will be going with their learning.

**Connections:**

This project could be used to assess all strands of the Language program: Writing, Reading, Oral Communication, and Media Literacy.

**Subject Area:**

English

**Connects to:**

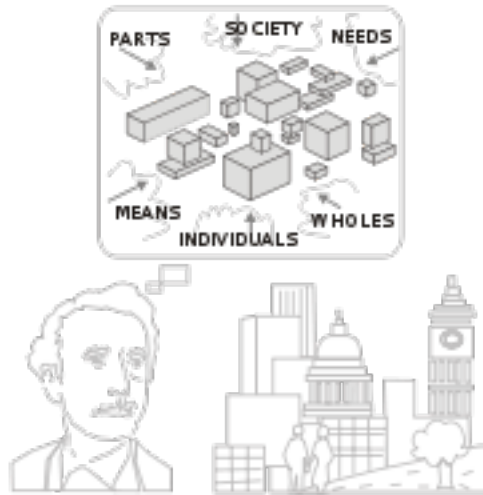
Grade 8

**Handouts:**

- Grade 8 systems summative success criteria

## Grade 8 Systems In Action

### Success Criteria for Summative Project



From Wikimedia Commons

*Throughout this unit, we have been looking at the structure and function of different systems, and using the Habits of Systems Thinking to analyse systems. In this task, you will apply your skills to a problem of your choice.*

You will need to:

- ☐ Brainstorm a list of ***natural*** or ***manmade*** systems that are of importance to your community, province, Canada, or the world (think back on the unit we have done, and some of the issues that were raised)
- ☐ Choose one system to focus on, and identify inputs, processes, outputs, and the function of that system
- ☐ Identify potential problems with the system
- ☐ Develop potential innovations to address the problem
- ☐ Prepare an oral and visual presentation (Prezi, Google Slideshow, etc) to communicate your findings

**Grade 8 Systems In**  
**Action Success Criteria for**  
**Summative Project**

**Knowledge and Understanding**

I have:

- ☐ clearly identified the system that I am investigating
- ☐ identified the inputs, processes, and outputs of the system

**Thinking & Investigation**

I have:

- ☐ gathered information from various (minimum 3) sources
- ☐ summarised key information in my own words
- ☐ identified the impact of this system on individuals, society, or the environment
- ☐ developed possible innovations to address potential challenges or problems posed by this system

**Communication**

I have:

- ☐ created a Systems flowchart to illustrate key systems information
- ☐ developed an oral report to share my findings with my class
- ☐ created a visual presentation to supplement my oral presentation
- ☐ my visual presentation summarizes key ideas
- ☐ used appropriate science and technology vocabulary to explain concepts

**Application**

I have:

- ☐ used three Habits of Systems Thinking to analyse the problem/system that I am investigation