What is the best way to connect Canada?

Lesson Overview
Students will begin by predicting which is the best way to connect Canada - by road, rail, waterway, air, or telecommunications and justifying their choice. There is no best way of course. It depends on the destination, mass, value and time sensitive nature of the items or information being moved from one place to another.

They will discover this as they use pages 36 and 37 of The Canadian Atlas. They will also compare the mass of materials being moved by the different modes and learn how technology has reduced the time needed to move a letter across the country. Students will recommend which modes should be developed further in light of environmental and economic concerns.

Grade Level
Grade 9/10

Time Required
75 – 150 minutes

Curriculum Connection
Ontario Grade 9 Academic or Applied

Link to Canadian National Geography Standards
Essential Element #1 (grade 9-12) - The World in Spatial Terms
- Map, globe and atlas use

Essential Element #2 (grade 9-12) - Places and Regions
- Interdependence of places and regions

Essential Element #6 (grade 9-12) - The Uses of Geography
- Influence of geographic features on the evolution of significant historic events and movements

Geographic Skill #2 (grade 9-12) - Acquiring Geographic Information
- Systematically locate and gather geographic information from a variety of sources

Geographic Skill #5 (grade 9-12) - Answering Geographic Questions
- Evaluate the answers to geographic questions

The Canadian Atlas
- See pages 36-37 Connecting Canada.
- See corresponding section of the Canadian Atlas website at [www.canadiangeographic.ca/atlas](http://www.canadiangeographic.ca/atlas)

Additional Resources, Materials and Equipment Required
- student activity sheet, access to computer lab with Internet connection
- Further Reading:
  - Refer students to these websites for information on the various ways of connecting Canada
Main Objective

Students will use *The Canadian Atlas* to compare the different methods of connecting Canada in terms of speed, cost, capacity and materials moved. They will see how technology has reduced the time needed to move a letter across the country. They will recommend which modes should be developed further in light of environmental and economic concerns.

Learning Outcomes (Ontario Provincial Curriculum Expectations)

By the end of the lesson, students will be able to:

- demonstrate an understanding of the characteristics of human systems (e.g. transportation, communication);
- explain the geographical requirements that determine the location of transportation systems and make predictions about future locations of these systems;
- make recommendations for appropriate forms of human systems (e.g. transportation);
- demonstrate an understanding of how human activities affect the environment

Evaluation

Used the attached evaluation rubric.

The Lesson

<table>
<thead>
<tr>
<th>Teacher Activity</th>
<th>Student Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>• Pose the question: “In what ways can we move materials or information to other parts of Canada?” • Pose the question: “What is the best way to connect Canada?” Students choose one mode and justify their choice. • Have several students present their</td>
</tr>
</tbody>
</table>

CBC Archives:


Other Sites

- Life After the Oil Crash [http://www.lifeaftertheoilcrash.net](http://www.lifeaftertheoilcrash.net)
choices and justifications briefly to the class.

| Lesson Development | • Direct students to read the evaluation rating scale  
|                     | • Have students complete the worksheet using pages 36-37  
|                     | • Complete the worksheet  
|                     | • Submit for evaluation by the teacher.  
| Conclusion         | • Lead a short classroom discussion about the oil peak, global warming and their impact on connecting Canada  
|                     | • Participation in discussion  

**Lesson Extension**

- **GIS mapping and Analysis**
  The following extension exercises are for those who are familiar with *ArcView GIS*. They are found on the ESRI website.

- **Mapping the St. Lawrence Seaway**
  The objective of this exercise is to create a map of the St. Lawrence Seaway. You will include features such as major water bodies, major cities, roads and railways. You will explore how the infrastructure of the St Lawrence Seaway has had an impact on the growth of the area.

**Lesson Extension**

- **Using Network Analyst to Find the Best Route**
  *ArcView Network Analyst* is an extension that solves network (streets, roads, rivers, pipelines, etc.) problems. One of the most common network problems is finding the best route among locations on a network.

  This exercise helps students understand Network Analyst and practice common *ArcView* skills by finding the best route for a courier. In the exercise students geocode addresses representing the stops the courier must make. They then use Network Analyst to determine the best route, in terms of shortest distance and quickest drive time.

Student Activity Sheet:
What is the best way to connect Canada?

There are different methods of connecting Canada in terms of speed, cost, capacity and materials moved. How do they compare? Which modes should be developed further in light of environmental and economic concerns?

Refer to the map Connecting Canada on pages 36-37 of The Canadian Atlas or the corresponding pages of the Atlas website at www.canadiangeographic.ca/atlas for the answers.

1. Predict the best way of connecting Canada and state your reason.

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

2. What is the most popular use of the Internet? Has this changed since 1998?

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

3. Which of the Internet uses has grown most quickly since 2001? (Hint: look at the slopes of the lines in the graph CANADA ONLINE).

_______________________________________________________________________
_______________________________________________________________________

4. What significant telecommunications milestone occurred in Canada in 1846?

_______________________________________________________________________
5. Fill in this table on telecommunication satellites:

<table>
<thead>
<tr>
<th>Telecommunications Satellites</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANIK F1 and ANIK E2</td>
<td></td>
</tr>
<tr>
<td>NIMIQ 1 and NIMIQ 2</td>
<td></td>
</tr>
<tr>
<td>MSAT</td>
<td></td>
</tr>
</tbody>
</table>

6. a) When was the cell phone introduced? ____________

   b) How many Canadians subscribed to a mobile phone service as of 2003? ________

   c) How will this have changed by 2005? ________________
7. Look at the orange-coloured map in the top right corner of p. 37 entitled: *Our Shrinking Country*. What does this map show? Why is it an effective way to present the information?

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

8. Look at the large map on p. 37 showing Canada’s *Transportation Networks*. Why do many of the road and rail lines follow the same path?

_______________________________________________________________________

_______________________________________________________________________

_______________________________________________________________________

9. Why would someone choose to ship material by water as opposed to air?

_______________________________________________________________________

_______________________________________________________________________

10. Look at the information given below,

- Go to https://energy.navy.mil/awareness/tools/tools_7.html [Note: copy this web address into your browser or search engine and click yes to override the expired site certificate warning on the site. The information then shows up.]
  - A transit bus with as few as seven passengers uses less fuel per passenger mile than a typical car with only a driver in it.
  - A transit bus with full rush hour load of 44 passengers uses much less fuel than 11 cars with 4 passengers each.
  - A fully loaded rail car is 15 times more energy efficient than the average automobile.
  - Trains are among the most energy-efficient mode of transport. In the United States, trucks use more than eight times as much energy to transport freight between cities as trains.
- Trains are among the most energy-efficient mode of transportation. Based on a measure of the amount of energy required to move one passenger one kilometre in the United States, an intercity train uses 948 kilojoules. A commercial airplane, on the other hand, uses three times this amount of energy, and an automobile with a single occupant uses six times this amount of energy.
- Cars emit 20 pounds of carbon dioxide for every gallon of gas consumed.


a) Make a one page recommendation to the Canadian government on what changes should be made in the way Canada is connected. Your recommendations should use the following headings, and be written in sentences.
- The future availability and cost of oil.
- The impact of fossil fuel use on the environment.
- The efficiency of different modes of connecting our country (don’t forget telecommunications!)
- Your recommendations for the next 25 years.
## Evaluation Rubric:
What is the best way to connect Canadians?

**Student’s Name:** ____________________________________________________

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
</tr>
<tr>
<td>Student shows knowledge and understanding of the speed, cost, capacity and materials moved by the various ways of connecting Canada.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td><strong>Inquiry</strong></td>
<td></td>
</tr>
<tr>
<td>Student uses the process of evaluation to decide which method of connecting Canada is the “best” and which method will be the “best” in the future.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td></td>
</tr>
<tr>
<td>Student communicates clearly, using complete sentences, correct grammar and spelling.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
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