Science and Technology 11
Transportation

Blackline Master

This blackline master package, which includes all section assignments, as well as selected worksheets, activities, and other materials for teachers to make their own overhead transparencies or photocopies, is designed to accompany Open School BC's ***Transportation*** module. The course and blackline master were developed by BC teachers, instructional designers, graphic artists, and multimedia experts.

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Section 1, Lesson A, Activity 1
Identify the Modes of Transportation

Put a check mark beside each item that you think is a mode of transportation.

	automobile
	train
	pipeline
	ski
	boat
	television
	wheelbarrow
	airplane
	communication satellite
	skateboard

Section 1, Lesson A, Activity 2
Transportation History

Indicate whether the statement is True or False.

	1. The first practical steam powered railroad locomotive was invented by Robert Fulton.
	2. The first engine airplane was invented and flown by the Wright Brothers.
	3. The assembly line for automobile manufacturing was improved by Alexander Graham Bell.
	4. An oxidizer is required to add boost to rocket fuel in order to fly to greater heights.

Section 1, Lesson B, Activity 1
Forces in Motion

Identify what happens to an airplane in each of these situations.

1. Lift exceeds weight

2. Lift equals weight

3. Weight exceeds lift

4. Thrust exceeds drag.

5. Thrust equals drag

6. Drag exceeds thrust

Section 1, Lesson B, Activity 2
Bernoulli's Principle

Indicate whether the statement is True or False.

	1. Fluid exerts more pressure the faster it travels.
	2. Air must travel a greater distance over top of a wing than below it.
	3. Air must travel faster over top of a wing than below it.
	4. Slower air beneath the wing pushes upwards with greater force than the faster air above pushes down on the wing.

Section 1, Lesson C, Activity 1
The Impact of Transportation

Here are a number of true and false statements about how transportation technologies have changed our lives. Mark true if you think transportation technologies have had this impact on our lives, and false if you don't think that the statement shows how transportation technologies have affected how we live. Give an explanation for each answer.

_____	1. Transportation technologies have helped people survive in extreme conditions.
_____	2. Transportation technologies have helped people explore new frontiers.
_____	3. Transportation technologies have added quality and enjoyment to life.
_____	4. Transportation technologies have not contributed to environmental concerns.
_____	5. Transportation technologies influence where we live and work.

_____	6. Transportation technologies have brought a stronger economy and better standard of living.
_____	7. People have not become dependent on transportation technologies.
_____	8. Transportation technology improvements have led to the growth of communities located by waterways.

Section 1, Lesson D, Activity 1
Name the Safety Technology

Match the safety technology to the correct mode of transportation.

_____	1. This device automatically slows a train when the maximum speed is exceeded.	a. Flight data recorder b. Trackside Acoustic Detectors c. Automatic Train Protection d. Synthetic vision
_____	2. This three-dimensional digital display allows pilots to see landforms in poor weather conditions.	
_____	3. This device records all instrument data and equipment performance on an airplane.	
_____	4. This device listens for sounds that are suggestive of bearing failure in train wheels.	

Section 2, Lesson A, Activity 1
Automobile History: Multiple Choice Questions

1. Which inventor built a three wheeled automobile powered by a large steam boiler?
    a. Karl Benz
    b. Leonarda da Vinci
    c. Joseph Cugnot
    d. Henry Ford

2. Why was the Gottlieb Daimler combustion engine better than the others?
    a. It was small, light weight, and fast .
    b. It had a gasoline-injected carburetor and a vertical cylinder.
    c. It could go as fast as 16 km per hour.
    d. all of the above

3. Who had the world's first automobile accident?
    a. Nicolas Cugnot
    b. Nicolaus Otto
    c. Karl Benz
    d. Henry Ford

4. Which inventor came up with the idea of the internal combustion engine?
    a. Gottlieb Daimler
    b. Nicolaus Otto
    c. Henry Ford
    d. none of the above

5. The modern vehicle is the result of the work and inventions by?
    a. one man only
    b. several people over the course of many years
    c. a team of people who worked together in Europe
    d. none of the above

6. In total there are how many patents for automobile parts and designs?
    a. too many to count
    b. approximately 1200
    c. over 100,000
    d. 42
7. Who helped develop the automobile?
    a. engineers, mechanics, and designers
    b. plumbers, welders, and boat builders
    c. artists and dancers
    d. none of the above

Section 2, Lesson B, Activity 1
Identify the Type of Automobile Feature

Choose the best category for each of these automobile features.

Safety	Performance/Vehicle Operation	Entertainment	Comfort	Environmental Protection

Sound system	
Anti-lock brakes	
GPS Navigation	
Engine	
Four wheel drive	
Airbags	
Air conditioner	
Hybrid power systems	

Section 2, Lesson D, Activity 1
Name that Fuel

Identify the correct fuel for each of these statements.

1. This fuel is grown from corn.	
2. This turns into gas when pressure is released and it vaporizes.	
3. This non-petroleum product is much more environmentally friendly than either gasoline or diesel.	
4. This can be used to fuel traditional diesel vehicles.	

Section 2, Lesson D, Activity 2
Think About It

Besides climate change, identify one other reason why alternative fuels are being tested.

Section 3, Lesson A, Activity 1

Match the Infrastructure to the Correct Transportation System

Use the type of transportation system, listed below, that matches the given infrastructure. Some forms of infrastructure will have more than one match.

Road **Rail** **Water** **Air**

1. freeway exit ramp	
2. terminal	
3. shipping lane	
4. railway crossing	
5. air traffic control tower	
6. bridge	
7. canal locks	
8. tunnel	
9. pedestrian crossing	
10. vehicle overpass	
11. speed bump	
12. wharf	

Section 3, Lesson D, Activity 1
Fill in the Blanks

Fill in the blanks with the name of the correct technology or intelligent transportation system.

1. Allows commercial trucks to be weighed without having to stop.

2. Sensors embedded in the road to detect the presence of vehicles passing by.

3. Cashless procedure used in some public transit systems.

4. Digital highway sign used to relay real time information to drivers.

5. Radio transmitter used to relay vehicle information to a control centre.

Section 3, Lesson E, Activity 1

Employment in Transportation, 2001–2007

The following table shows the total number of people employed in transportation and transportation-related industries in Canada from 2001–2007.

	Thousands of Employees						
	2001	2002	2003	2004	2005	2006	2007
Transport Services/ Infrastructure							
Air	80.8	75.7	79.0	80.0	80.1	81.6	84.6
Marine	26.8	27.7	27.8	29.5	31.6	33.0	33.6
Rail	39.5	37.3	36.4	35.6	35.0	34.1	34.0
Trucking	318.7	326.3	321.8	345.0	356.2	366.4	375.0
Bus/urban transit	93.4	93.2	92.3	91.4	91.5	94.4	95.0
Taxi	14.4	15.1	14.6	14.5	14.7	14.9	15.1
Highway	58.8	55.7	54.9	56.5	57.0	58.0	60.1
Other	52.8	52.5	52.8	53.5	53.9	57.2	58.0
Total	**685.3**	**683.5**	**679.6**	**706.0**	**719.9**	**739.7**	**755.4**

Transport Canada. 2007. “Table EC29: Employment in the Transport Sector, 2001 - 2007” (table). *Transportation in Canada 2007*. Transport Canada Catalogue no. TP 14816E. http://www.tc.gc.ca/pol/en/report/anre2007/add/table-ec29.htm (accessed April 23, 2009).

1. Which transportation service employs the greatest number of people?

2. How many people were employed in marine transportation services in 2003?

3. How many people were employed in air transportation services in 2007?

4. Which transportation service has seen a steady decline in the number of employees since 2001?

5. Which transportation service has seen the largest growth in the number of employees since 2001?

Section 3, Lesson E, Activity 2
Commuting Methods, 2001

The following table shows how Canadians in urban areas get to and from work. The methods that people use vary based on how far away from their job they live.

Residence to Job	Commuting Methods (in percent)					
	Public Transportation	Driver	Passenger	Walk	Bicycle	Other
0 to 5 km	14.9	57.0	8.3	15.8	2.7	1.3
5 to 10 km	19.8	70.5	7.2	0.8	1.0	0.6
10 to 15 km	17.0	75.6	6.1	0.5	0.4	0.4
15 to 20 km	14.5	78.6	5.8	0.5	0.2	0.4
20 to 25 km	13.3	80.2	5.5	0.5	0.1	0.4
More than 25 km	11.1	79.2	5.9	2.6	0.4	0.8

Adapted from: Statistics Canada. 2005. "Table 3.4: Percentage distribution of workers living in higher income families (more than $75,000) by commuting mode in 2001, selected demographic groups, all workers in CMAs" (table). *Work and Commuting in Census Metropolitan Areas, 1996-2001*. Statistics Canada Catalogue no. 89-613-MIE, No. 007. http://www.statcan.gc.ca/pub/89-613-m/89-613-m2005007-eng.pdf (accessed April 23, 2009). p. 50.

Which of the following statements correctly describe(s) statistics in this table? (There may be more than one correct answer.)

a. The further people live from their job, the more likely they are to catch a ride to work with someone else.

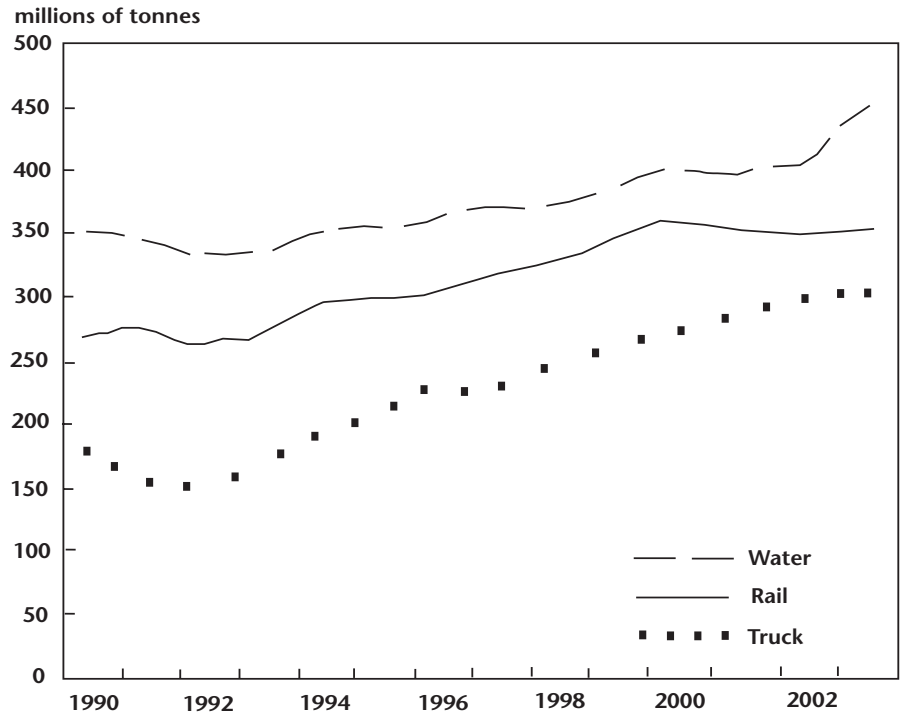
b. The further people live from their job, the more likely they are to drive to work than they are to take the bus or commute by some other means.

c. Most people who use public transportation live 5-10 km away from their job.

d. The closer people live to their job the more likely it is they will walk or ride their bikes.

Section 3, Lesson E, Activity 3
Shipping Methods, 1990–2003

This line graph shows the quantity of goods shipped in Canada by water, rail, and truck.



Statistics Canada.2006. “Chart 1.2 Freight shipped for selected modes of transport” (chart). *Human Activity and the Environment: Annual Statistics 2006*. Statistics Canada Catalogue no. 16-201-XWE. http://www.statcan.gc.ca/pub/16-201-x/2006000/9515-eng.htm (accessed April 23, 2009).

1. What mode of transport was used to ship the most goods from 1990–2003?

2. Approximately how many tonnes of freight were shipped by rail in 2000?

3. Approximately how many tonnes of freight were shipped by truck in 2000?

4. Which mode of transport showed the greatest overall increase from 1990–2003?

Section 1 Assignment: Part 1
Important Modes of Transportation

1. Who invented the first locomotive? (1 mark)

2. What “fuel” was used to power this locomotive? (1 mark)

3. Describe briefly in your own words how this locomotive worked. (2 marks)

4. Who built the first operational airplane? (1 mark)

5. Name two other flying objects from which the inventors in number 4 drew inspiration. (0.5 marks each = 1 mark total)

6. Which early 20th century American businessman began making affordable automobiles for the average person? (1 mark)

7. What was the name of his company? (1 mark)

8. What invention did the man in #6 come up with, as a way to make cars fast and cheaper? (1 mark)

9. In your own words, explain briefly how this invention works. (2 marks)

10. Who invented the liquid-fuelled rocket? (1 mark)

11. What two main components made this rocket so powerful? (0.5 marks each = 1 mark total)

12. In your own words briefly explain how the liquid-fuelled rocket worked. (2 marks)

Section 1 Assignment: Part 2
The Science of Flight

Answer the following questions in full sentences, and in your own words. (15 marks)

1. Explain Newton's three laws of motion and how they affect the flight of an airplane. (6 marks)

2. What are the four forces that act on an airplane? Describe each. (4 marks)

3. What is Bernoulli's Principle and how can it be used to explain how an airplane rises into the air? (5 marks)

Section 1 Assignment: Part 3
Our Reliance on Transportation

Complete Option A **or** Option B.

Option A: Transportation Photo Gallery

Create a gallery of at least ten photographs or drawings that show our reliance on transportation. Include several examples of each of the following in your gallery: modes of transportation, transportation services, buildings, products, and occupations. Include a detailed description for each image explaining what the photograph is and how it shows our reliance on transportation. You may create this as a print booklet, an electronic slide show, a web page, or other formats. Discuss your ideas with your teacher before you begin to make sure your choice is acceptable.

Evaluation Guidelines	Marks
0.5 marks for each image that accurately shows our reliance on transportation, up to a maximum of 5 marks.	5
Detailed and accurate description for each image, demonstrating that reliance.	10
Total Marks	/15

Option B: Response to Alternate Mode of Transportation

Use an alternate mode of transportation for at least two days and write a short report (at least two paragraphs) on your experience. See the Evaluation Guidelines that follow for what to include in your report:

Evaluation Guidelines	Marks
Your report clearly explains • what mode of transportation you typically use. • what place(s) you typically go to using this mode of transportation. • what alternate mode of transportation you used instead. • what effect(s) this change had on your daily routine. • what you thought of the switch: Which parts were the hardest? The easiest? What were the biggest adjustments you had to make? Would you consider using this alternate mode more	15

often? Why or why not?	
Total Marks	/15

Section 1 Assignment: Part 4
Transportation Safety Questions

In your own words, and in full sentences, explain how each of these transportation safety technologies works. Be sure to identify which mode of transportation it is used with as well. (10 marks)

1. Cockpit voice recorder

2. Synthetic vision

3. Trackside acoustic detector

4. Automatic train protection

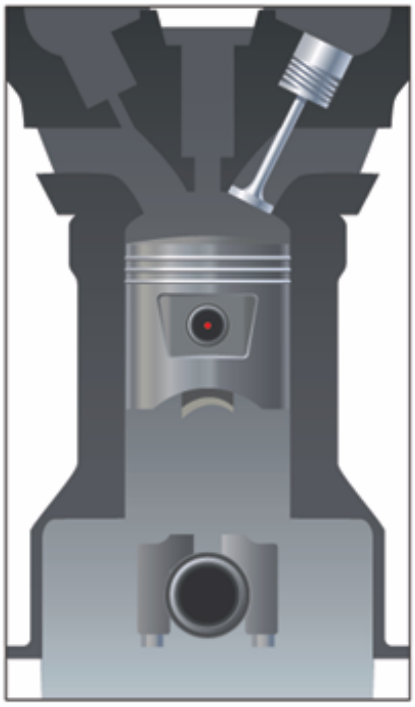
5. Watertight compartment

Evaluation Guidelines	Marks
Clear and accurate description of each transportation safety technology.	10
Total Marks	/10

Section 2 Assignment: Part 1
The Internal Combustion Engine

1. Who invented the internal combustion engine? (1 mark)

2. Indentify the three parts that are missing from this internal combustion engine. (3 marks)



   a.

   b.

   c.

3. What role(s) do these missing parts perform in the internal combustion engine? Could the engine operate without them? Why or why not? Describe each part separately. (6 marks)

Section 2 Assignment: Part 2
Describe an Automobile Feature

Complete A and B.

A. Choose two of the following safety technologies described in Lesson B. In your own words, and in paragraph form, describe how each of these technologies works. (10 marks)

Seat belt	Air bag	Drum brakes	Power steering

B. Choose another automobile feature and research how it is made and how it works. Present your findings in a written report, an electronic presentation, or a video clip. Be sure to include the following: (24 marks

- a written or verbal description of what the feature does, how it works, and what it's made of.
- one or more labeled diagrams showing the parts of the feature, or a video demonstration of the actual feature.

Choose from one of the following features:

Anti-lock brakes	Ignition system	Global positioning system
Electronic stability control	Air conditioning	

Evaluation Guidelines	Marks
Part A: Detailed and accurate description for how the two safety technologies work.	10
Part B: You will receive a mark out of 4 for each of the three categories in the following table. Your score will be weighted x 2 for a total of 24 marks.	24
Total Marks	/34

The Features of the Automobile Scoring Guide

	• Content	• Organization	• Visuals
4 ➨ Good! Your description is detailed, accurate, and easy to understand.	• feature's operation is stated clearly • feature's materials are accurately described • explanation is made of how the feature has made a difference to the automobile	• substantial preparation is evident • description of operation follows a step by step or chronological format • diagrams or other visuals are placed at logical points in the description	• visuals are carefully chosen to enhance the explanation • labelling is detailed, accurate and clear • diagrams are easy to understand • video presentation is clear, detailed, and easy to follow
3 ➨ A Pass! Your description is accurate and clear.	• feature's operation is described adequately • feature's materials are stated • feature's function is stated	• some preparation is evident • description of operation is clearly developed • helpful diagrams are present but they may not be in the best place	• visuals are sufficient to support the explanation • labelling is accurate and clear • diagrams are mostly easy to understand • video presentation is easy to follow
2 ➨ Almost! Your description is too short or confusing.	• feature's operation is stated, but it is not clearly understandable • feature's materials are not completely described • feature's function is addressed too briefly	• little preparation is evident • loose structure is present but difficult to follow	• diagrams are unclear or confusing in some places • labelling is confusing or insufficient • parts of the video presentation (if used) are not easy to follow
1 ➨ Not Yet! Your description is inaccurate and incomplete.	• description of feature's operation is not correct, does not make sense, or is incomplete • feature's materials are not described • feature's function is not given	• preparation is not evident • no organization of the explanation of the feature's operation	• diagrams or other visuals are not used • Where diagrams are used, they are unclear or confusing • audience is unable to understand or follow the presentation (if video)
0 ➨ Not At All	Description is too brief to evaluate or not attempted at all.		

Section 2 Assignment: Part 3
Eco-Friendly Driving

1. In Lesson C you learned about several important driver behaviours and driving techniques. These are designed to achieve three main goals. What are those goals? (3 marks)

2. From the following list choose five statements that demonstrate proper eco-friendly driving attitudes and behaviours. Put a check mark beside your choices. (5 marks)

	a. Plan ahead to avoid congested routes and prevent backtracking.
	b. In mild weather idle your vehicle for 0–30 seconds maximum before driving.
	c. In cold weather warm your vehicle for at least 5 minutes to ensure it operates at peak efficiency
	d. Use premium grade gasoline.
	e. Turn off your engine if you're stopped for more than 60 seconds and it's safe.
	f. Always keep your engine running when you stop, as it burns less gas than restarting the engine does.
	g. Accelerate gradually and evenly.
	h. Remove objects from the outside or top of your vehicle that cause aerodynamic drag.

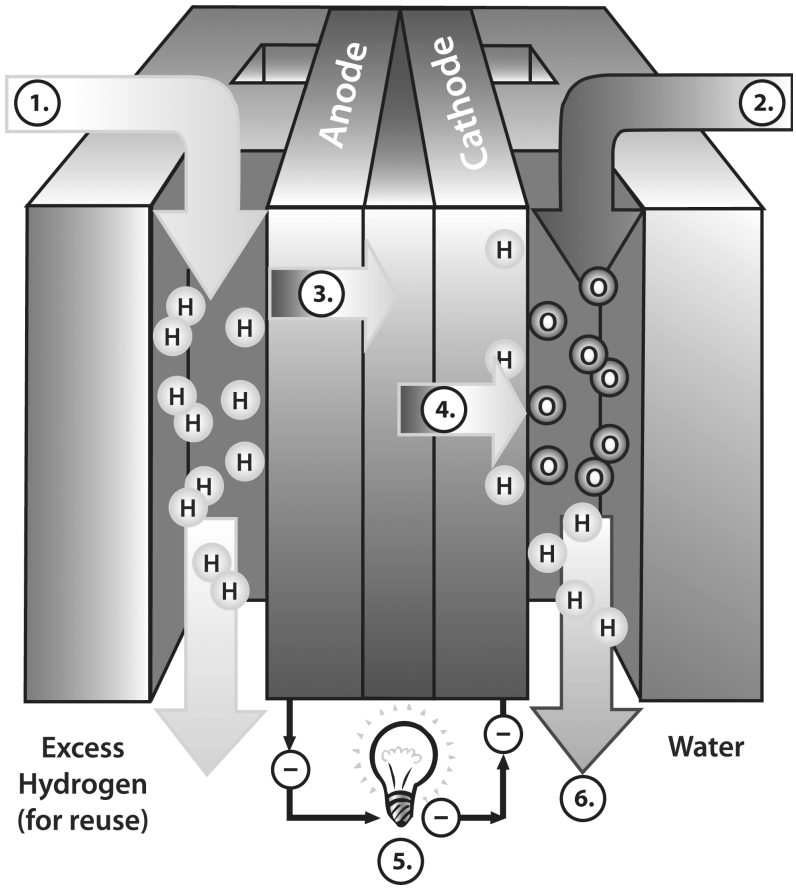
3. What is climate change? Describe how automobiles are believed to have contributed to this phenomenon. (2 marks)

Section 2 Assignment: Part 4
Alternate Fuel Sources

1. Identify three advantages of biodiesel as an alternate fuel source. (3 marks)

2. What is the potential “downside” of ethanol as an alternate fuel source? (2 marks)

3. Explain what happens in each part of the hydrogen fuel cell. Write your answers on the lines provided. (6 marks)



1.

2.

3.

4.

5.

6.

4. Give two advantages of the hydrogen fuel cell. (2 marks)

5. Give three disadvantages of the hydrogen fuel cell. (3 marks)

Section 3 Assignment: Part 1

The Pacific Gateway

In one or two paragraphs, describe the Pacific Gateway Strategy and its importance to BC's economy. Review Lesson A and the *Pacific Gateway* and *Opportunity in Motion* videos on your Science and Technology 11 *Transportation* CD for more information. (5 marks)

Section 3 Assignment: Part 2
Transportation Megaproject Report

Choose **one** of the following three transportation megaprojects and write a report on it. Each project is slightly different, so read the descriptions carefully before you make your choice. Be sure to thoroughly explore the media resources listed for your chosen option as well. These resources will provide you with more than enough information to complete the assignment. You'll fi nd these resources on your Science and Technology 11 *Transportation* Media CD.

Option A: Park Bridge
Park Bridge crosses high above the Kicking Horse River near the town of Golden BC. Write a report on this bridge that includes information on the following:

- The importance of the bridge to our transportation systems and why
- A construction timeline (when it was started, significant completion milestones, when it was completed)
- Facts and figures about the bridge (e.g., dimensions of the bridge, total cost, amount of earth removed from the site)
- Significant challenges faced during construction (e.g., due to the physical landscape, weather, railway in the construction area)
- Technologies used to build the bridge (e.g., steel girder launch process)

CD Resources:
Check the following resources in the *Park Bridge* section of your *Transportation* CD. These will help you complete this option.

- Photo gallery—photos of the bridge's construction, surrounding landscape, etc.
- Videos—includes several virtual flyovers of the Kicking Horse Canyon; a computer animated version of the bridge (slightly different than the final bridge); construction update videos; and a time lapse video of the bridge's construction (very cool!)
- Animation—shows how the steel girders are pushed into position on the bridge towers
- Documents—background information on the Kicking Horse Canyon and interesting facts and figures about Park Bridge

Option B: W. R. Bennett Bridge
The William R. Bennett Bridge was built to replace the aging Okanagan Lake Bridge in Kelowna. Write a report on this bridge that includes information on the following:

- The importance of the bridge to the Okanagan Valley and why
- A construction timeline (when it was started, significant completion milestones, when it was completed)
- Facts and figures about the bridge (e.g., dimensions of the bridge, total cost, amount of earth removed from the site)
- Significant challenges faced during construction (e.g., unique challenges of building a massive structure across a lake)

- Technologies used to build the bridge (e.g., graving dock, concrete pontoons, steel cables, and anchors)
- Similarities to and differences from the old bridge (Okanagan Lake Bridge)

CD Resources:
Check the following resources in the *W. R. Bennett Bridge* section of your *Transportation* CD. These will help you complete this option.

- Photo gallery—photos of the bridge's construction, surrounding landscape, etc.
- Videos—includes a virtual flyover of Okanagan Lake; a time lapse video of the bridge's construction (sorry, not great quality); and a time lapse video of the construction of one of the concrete pontoons at the graving dock
- Documents—background information on the bridge, and interesting facts and figures about it

Option C: Sea to Sky Highway
The Sea to Sky Highway connects West Vancouver to communities along Howe Sound, including Whistler. Hundreds of millions of dollars are being spent to upgrade this highway in time for the 2010 Winter Olympics. Write a report on the Sea to Sky Highway that includes information on the following:

- Why the highway needed to be upgraded
- A description of the physical landscape of the area
- Engineering challenges posed by this landscape
- Impact of construction on traffic and on local communities during construction and efforts to minimize that impact
- Innovative construction techniques used to upgrade the highway (describe two)

CD Resources:
Check the following resources in the *Sea to Sky Highway* section of your *Transportation* CD. These will help you complete this option.

- Photo gallery—photos of all aspects of the Sea to Sky Highway construction process
- Videos—a virtual flyover of the region; plus an overview of the Sea to Sky Highway Improvement project (including information on the challenges posed by the rugged terrain and responses by local residents to the construction process)
- Documents—background information on the Sea to Sky Highway Project including cost projections; innovative construction techniques to keep traffic moving and construction on schedule; and a description of improvements to the highway that will make it safer for drivers

Evaluation Guidelines	Marks
You will receive a mark out of 5 for each of the following. Marks will be awarded for clarity of writing, accuracy, and level of detail.	
Significance/impact—be sure to describe: • the importance of this megaproject on the people of the area, on other travellers, and on the economy	5

• how things have improved or will improve with the completion of this project	
Construction timeline—be sure to describe: • key events in the construction of your chosen megaproject, and their dates.	5
Facts and figures—be sure to describe: • interesting and significant facts and figures about your chosen megaproject, e.g., cost, size, amount of material used. Arrange this in a list or a table for easy reference.	5
Technologies/equipment—be sure to describe: • one of the technologies or pieces of equipment used on the megaproject (e.g., girder launcher), or one of the actual parts that is produced (e.g., concrete pontoons)	5
Obstacles/challenges—be sure to describe: • the physical landscape of the area and how this posed challenges to construction and/or dictated the type of construction that was undertaken	5
Total Marks	/25

Section 3 Assignment: Part 3
The Port of Prince Rupert

Complete Option A **or** Option B.

Option A: Create a Promotional Brochure for Prince Rupert
You're a marketing representative with the Prince Rupert Port Authority. Create a one-page promotional brochure that will convince companies in Asia to ship their products to Prince Rupert and not somewhere else. Describe the advantages Prince Rupert has over other North American ports. You might also consider including one or more fictional testimonials from other "clients". These are make-believe quotations from other companies who use your port and are happy with their choice. Explain why they chose Prince Rupert (i.e., describe one or more of its strategic advantages). These testimonials should supplement but not replace the main information on your promotion.

Include visuals that support your statements and that make your presentation more visually attractive. See Prince Rupert in the Extra Resources section of your Science and Technology 11 *Transportation* Media CD for photos and a sample brochure from the actual Prince Rupert Port Authority.

Evaluation Guidelines	Marks
You will receive a mark out of 4 for each of the three categories in the following table.	12
Total Marks	/12

Promotion Grading Table

	Content	Organization	Visuals
4 ➸ Very Good! Your promotion is convincing, accurate, and attractive.	• Clear and accurate description of the advantages of Prince Rupert • A convincing argument for using the Port of Prince Rupert	• Promotion is clearly organized with proper use of titles, headings, and separation between sections • Considerable thought is put into the effective layout of information	• Visuals are carefully chosen to enhance the explanation • Visuals are extremely attractive, creating a professional-looking product
3 ➸ Good! Your promotion covers the main points well but has a few minor problems.	• Prince Rupert's advantages and disadvantages are described well with only minor omissions or errors • Slight improvements would make the argument even more convincing	• Promotion is well organized with only minor improvements needed • Layout is well thought out	• Visuals support the content for the most part • Visuals are attractive
2 ➸ OK Your promotion needed a bit more work though.	• The advantages of Prince Rupert aren't explained properly or fully which weakens your message.	• Promotion appears hastily arranged and organized	• Visuals are poorly chosen and/or placed • Promotion has an unprofessional look
1 ➸ Not Yet! Your promotion needed a lot more work .	• Little effort was made to explain the advantages of Prince Rupert, or you don't appear to understand what those advantages are	• Poorly organized • Messy • Much more effort was needed	• Visuals missing or poorly chosen and/or placed • Very unappealing look
0 ➸ Not At All	Promotion is too brief to evaluate or not attempted at all.		

Option B: Create an FAQ Sheet on Prince Rupert

You're a marketing representative with the Prince Rupert Port Authority. Every day you field questions from the public about your new shipping terminal. Create an FAQ sheet (Frequently Asked Questions) about the Port of Prince Rupert that will answer many of these questions. Your FAQ sheet should include at least five questions and the answers to each of them. Refer to the Prince Rupert lesson for ideas and for the details you

need. Focus on things such as the advantages of Prince Rupert vs. other ports (there are several, each which could be a separate question).

Evaluation Guidelines	Marks
You will receive a mark out of 4 for each of the three categories in the following table.	12
Total Marks	/12

FAQ Grading Table

	Content	Organization	Visuals
4 ➡ **Very good!** **Your FAQ document thoroughly and accurately covers the main points, is well organized, and includes good visuals.**	• Questions are well chosen and are clearly and accurately answered • Questions and answers focus on the most important information about Prince Rupert, not trivial facts and details	• Document is properly formatted with questions in bold and answers below. • The most important and/or all encompassing questions and answers come first • Q and A's follow a logical order and "build" on each other	• Visuals are carefully chosen to enhance the explanation • Visuals are well positioned in the document to support your points • Visuals have appropriate descriptions / captions
3 ➡ **Good!** **Your FAQ document has only a few minor problems.**	• Most of the questions are well chosen and answered. There may be one or two that are a bit trivial and/or not fully answered.	• Document is properly formatted with questions in bold and answers below. • Questions follow a mostly logical order	• Visuals support the content for the most part • Visuals are attractive but one or more may have been positioned and/or described better
2 ➡ **OK** **Your FAQ document needed a bit more work.**	• Some of the questions are trivial and/or not fully or accurately answered	• There are some formatting problems • Questions appear to be randomly arranged, which interferes with meaning	• Visuals are poorly chosen and/or placed • FAQ document has an unprofessional look
1 ➡ **Not Yet!** **Your FAQ document needed a lot more work.**	• Little effort was made in choosing effective and significant questions	• The required format is not followed • Questions are randomly arranged which greatly interferes with meaning	• Visuals missing or poorly chosen and/or placed • Very unappealing look
0 ➡ **Not At All**	FAQ document is too brief to evaluate or not attempted at all.		

Section 3 Assignment: Part 4
Intelligent Transportation Systems

There are 9 scenarios below. In the space to the left of each scenario write the letter of the intelligent transportation technology that would be used.

a. Advanced Traveller Information Systems
b. Advanced Traffic Management Systems
c. Automatic Number Plate Recognition
d. Automatic Vehicle Identification
e. Crash Prevention and Safety Technologies
f. Inductive Loop Detection
g. Electronic fare collection
h. Weigh in Motion

	1. While you wait to cross the US border, a transport truck drives through without stopping.
	2. Before you leave you check the BC Ferries website to see if there are any sailing waits from Victoria to Vancouver.
	3. You hop on the bus and swipe your card through the reader by the front door.
	4. You drive over an embedded strip on a road that detects your car's magnetic field.
	5. You decide to take Highway 407 while travelling in Toronto. A bill arrives in the mail.
	6. A digital sign warns you of snow on the mountain pass ahead.
	7. A transport truck sends data to officials at a roadside scale without stopping.
	8. Traffic lights at a tunnel entrance direct you to use the right lane only, as traffic coming the other way now has the right to the other two lanes.
	9. Traffic on the highway seems light, and you're directed to move to another lane as the one you're in is closing.

Section 3 Assignment: Part 5
Analyzing Transportation Statistics

Refer to Table 1 to answer the following questions.

Table 1: Vehicle Activity by Body Type, 2005

	Vehicles (millions)	Vehicle - kilometres	Passenger - kilometres (billions)	Persons per vehicle	Fuel efficiency (litres/100 km)
Total light vehicles	18.0	287.7	493.7	1.7	10.6
Light trucks or vans					
Van	2.9	53.6	111.7	2.1	11.5
Sport utility vehicle	1.4	23.3	45.0	1.9	…
Pickup	3.3	49.5	76.8	1.6	14.0
Cars and station wagons					
Car	10.0	154.3	249.7	1.6	9.1
Station wagon	0.3	5.1	7.9	1.6	…

Adapted from: Statistics Canada. 2006. "Text table 1.2: Vehicle activity by vehicle body type, 2005" (table). *Human Activity and the Environment: Annual Statistics 2006*. Statistics Canada Catalogue no. 16-201-XWE. http://www.statcan.gc.ca/pub/16-201-x/2006000/4113886-eng.htm (accessed April 23, 2009).

1. Of the 18 million light vehicles on the road in Canada in 2005, how many were vans, sport utility vehicles, and pickups?
2. Which vehicle type has the best fuel efficiency?
3. Which vehicle type is the most popular in terms of use?
4. Which type of vehicle carries the most passengers, on average?

Refer to Table 2 to answer the following questions.

Table 2: Canadian Exports to the US by Mode of Transportation, 2007

	Canadian Exports to the US										
	Total exports (millions of dollars)						Share in percent				
	All Modes	Road	Rail	Marine	Air	Other	Road	Rail	Marine	Air	Other
1997	243,888	145,544	53,879	6,725	12,195	25,444	59.7	22.1	2.8	5.0	10.5
1998	269,909	169,135	56,612	6,233	13,980	24,348	62.7	20.8	2.3	5.2	9.0
1999	308,076	185,386	70,147	6,927	17,521	28,095	60.2	22.8	2.2	5.7	9.1
2000	359,289	200,311	75,593	9,440	23,845	50,100	55.8	21.0	2.6	6.6	13.9
2001	351,751	192,449	75,268	9,592	21,875	52,567	54.7	21.4	2.7	6.2	14.9
2002	345,366	196,869	75,632	11,346	18,905	42,614	57.0	21.9	3.3	5.5	12.3
2003	326,700	173,465	71,671	12,061	17,290	52,212	53.1	21.9	3.7	5.3	16.0
2004	347,889	183,445	77,303	13,566	15,688	57,888	52.7	22.2	3.9	4.5	16.6
2005	365,436	184,479	75,088	17,255	16,556	72,059	50.5	20.5	4.7	4.5	19.7
2006	358,937	181,716	73,629	18,810	14,597	70,185	50.6	20.5	5.2	4.1	19.6
2007	354,210	174,316	72,213	20,773	15,637	71,271	49.2	20.4	5.9	4.4	20.1

Adapted from: Transport Canada. 2007. “Table EC6: Modal Shares in Canada—United States Trade, 1997–2007” (table). Transportation in Canada 2007. Transport Canada Catalogue no. TP 14816E. http://www.tc.gc.ca/policy/report/anre2007/add/table-ec6.htm (accessed April 23, 2009).

5. By which mode of transportation does the highest dollar value of goods travel to the United States?
6. Which mode of transportation has seen its share of the export business decline the most?
7. Which mode of transportation has seen its share of the export business increase the most?

Refer to Table 3 to answer the following questions.

Table 3: Greenhouse Gas Emissions from Transportation

	Carbon Dioxide (CO_2)		Methane (CH_4)		Nitrous oxide (N_20)		CO_2 equivalents[1]		
	1990	2004	1990	2004	1990	2004	1990	2004	Percentage change 1990 to 2004
	kilotonnes								percent
Transportation	**142,000**	**185,000**	**30**	**30**	**20**	**30**	**150,000**	**190,000**	**29.9**
Domestic aviation	6,220	7,590	0.5	0.4	0.6	0.7	6,400	7,800	22.0
Road transportation	103,000	140,000	16	12	12	16	107,000	145,000	35.9
Light automobiles	52,300	48,600	9	4	6	6	54,400	50,600	-7.2
Light trucks	20,900	41,800	4	5	4	8	22,300	44,500	99.6
Heavy-duty vehicles	27,300	48,500	2	3	1	2	27,700	49,100	77.5
Motorcycles	225	214	0.18	0.17	0.00	0.00	230	219	-4.8
Propane and natural gas vehicles	2,160	837	2	1	0.04	0.02	2,200	870	-60.7
Railways	6,320	5,350	0.3	0.3	3	2	7,000	6,000	-15.3
Domestic marine	4,730	6,260	0.4	0.5	1	1	5,000	6,600	31.3
Other	22,000	26,000	10	10	4	6	20,000	30,000	17.9

1. CO_2 equivalents are the weighted sum of all greenhouse gas emissions.

Adapted from: Statistics Canada. 2006. "Text table 1.7: Greenhouse gas emissions from transportation" (table). *Human Activity and the Environment: Annual Statistics 2006*. Statistics Canada Catalogue no. 16-201-XWE. http://www.statcan.gc.ca/pub/16-201-x/2006000/9515-eng.htm (accessed April 23, 2009).

8. What happened to total greenhouse gas emissions from transportation during this time? Did they go up or down, and by how much overall?
9. What major category of transportation was most responsible for this?