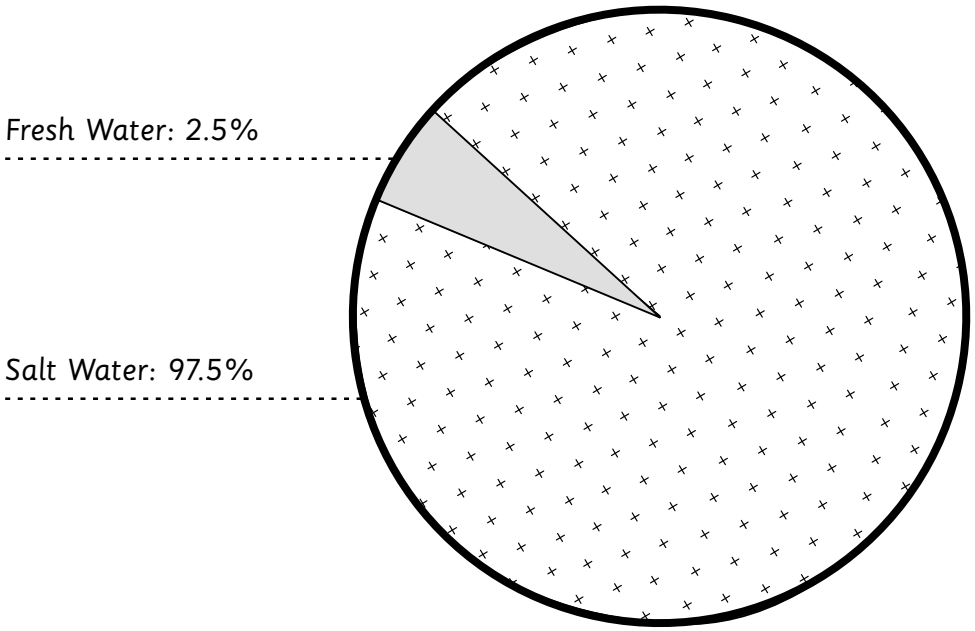
Name: _____

Mapping Our Water

Section A) Global Distribution of Salt Water vs. Fresh Water

1. *Of all the water in the world, 97.5% is salt water, and only 2.5% is fresh, or drinkable water.*



2. *Fresh water can be divided into two kinds:*
   - *Water that is difficult to access:*

Icecaps and Glaciers 70%	**Groundwater 30%**

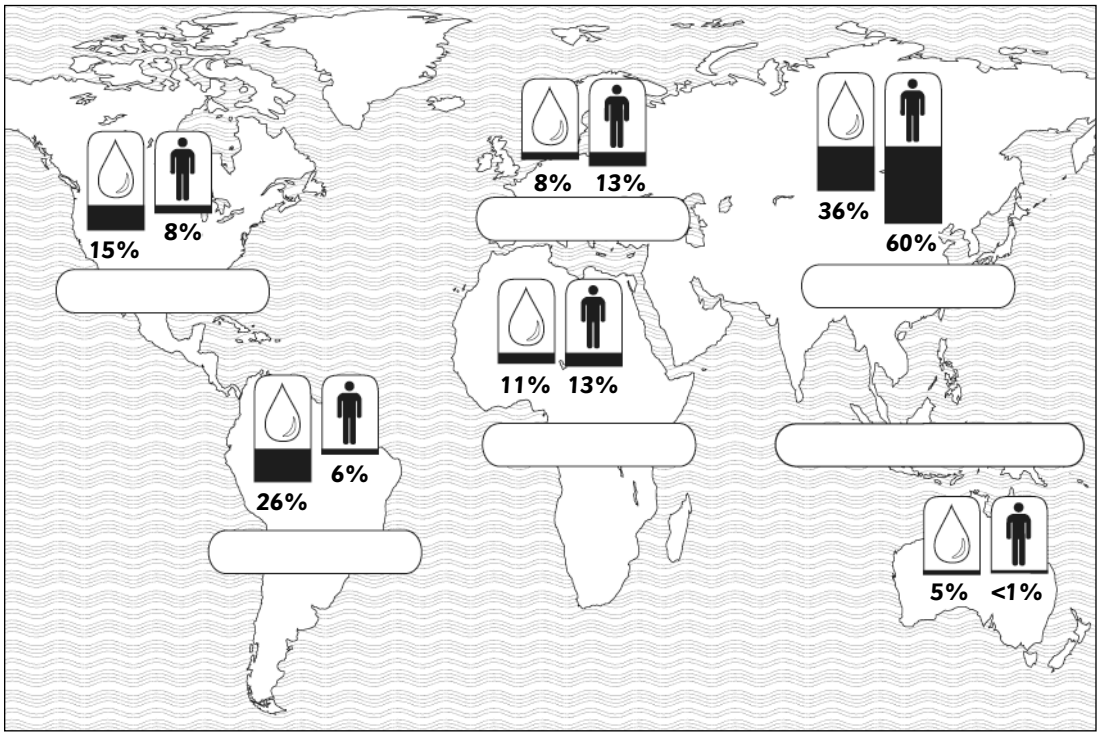
   - *Available surface water in liquid form:*

Lakes 88%	**Wetlands 10%**	**Rivers 2%** ←

Soil moisture, atmospheric water vapour and water incorporated in biota is not represented in charts above.

Name: _____

3. *Where in the world is the available fresh water? Name the continent in the space provided.*



** Totals do not add up exactly to 100 percent due to rounding.*
Source: Environment Canada, 2004.

i) *What percentage of the world's available water is found in North and Central America?*

_____

ii) *What percentage of the world's population lives in North and Central America?*

_____

iii) *What percentage of the world's available water is found in Africa?*

_____

Name: _____

iv) What percentage of the world's population lives in Africa?

v) Does this mean that North and Central Americans have more fresh water per person or less fresh water per person than Africans? Explain your answer.

vi) Which continents have a larger percent of the world's available fresh water than they do of the world's population (meaning they are "rich" in water)?

vii) Which continents have a larger percent of the world's population than they do of the world's available fresh water (meaning they have a water shortage)?

viii) Which continent has the least amount of fresh water per person?

ix) Which continent has the most fresh water per person?

Name: _____

4. *The map in Question 3 showed you that not all people in the world have equal access to fresh water. Some continents are considered "water rich" and some "water poor". Do you think this would affect how efficiently people who live there use their water?*

   i) *How efficiently do you think a water rich country uses their fresh water? Explain.*

   ii) *How efficiently do you think a water poor country uses their fresh water? Explain.*

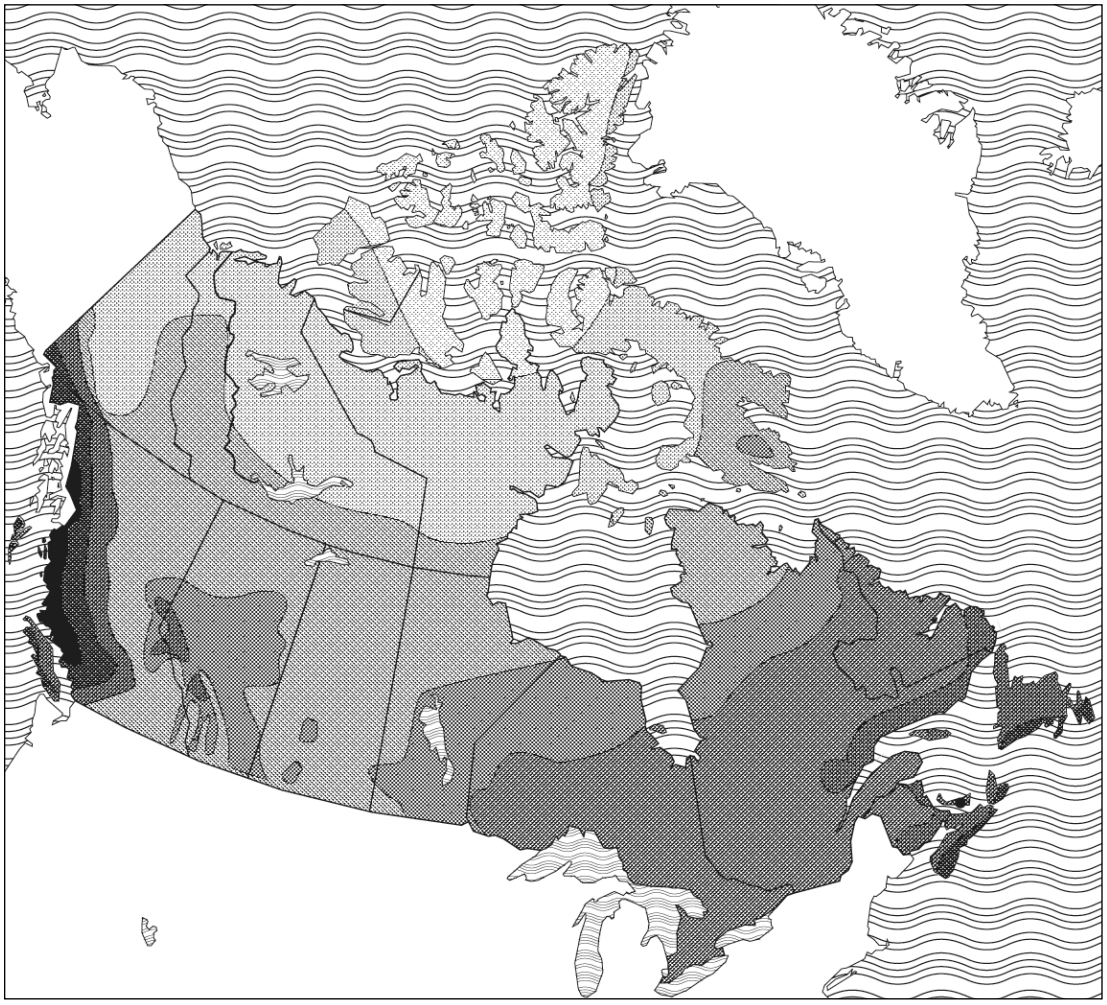
   iii) *How do you think Canadians treat our fresh water resources?*

Name: _____

Section B) Researching Canada's Water

After Brazil and Russia, Canada has the most renewable fresh water resources of all countries in the world. Renewable fresh water is water that replenishes, or comes back, after it is taken. So where does all our water come from? Our fresh water flows from rivers, lakes, glaciers, wetlands, precipitation (rain and snow) and some is stored as groundwater. Use the maps provided, along with an atlas and other reference materials, to answer the following questions.

1. Precipitation in Canada



Average Annual Precipitation (mm)

0 300 500 800 1500 2500 3500 5500

Source: Environment Canada

Name: _____

i) Which province or territory gets the most rainfall?

ii) Which provinces and/or territories have areas with the least amount of rainfall?

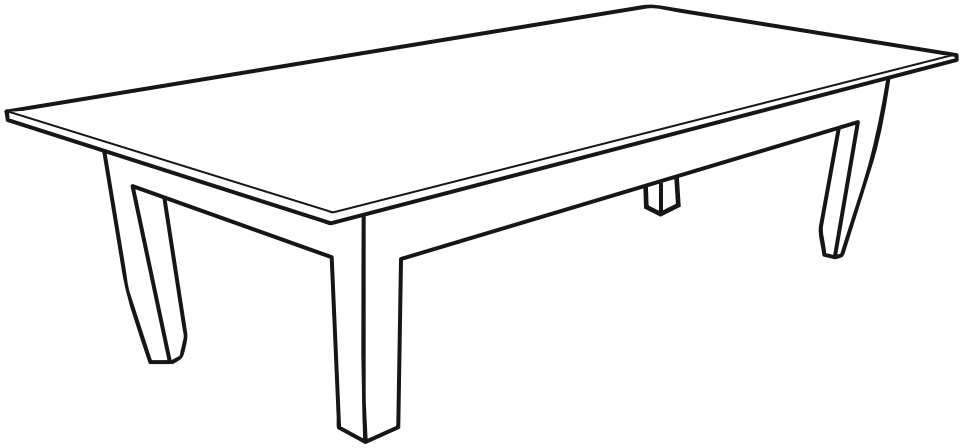
iii) Do some research to find out why the west coast of British Columbia gets so much more rainfall than the eastern border next to Alberta.

iv) We know that plants need water to grow but is there such a thing as too much rain for crops? Are most Canadian farms located in areas with the most, the least or a medium amount of precipitation?

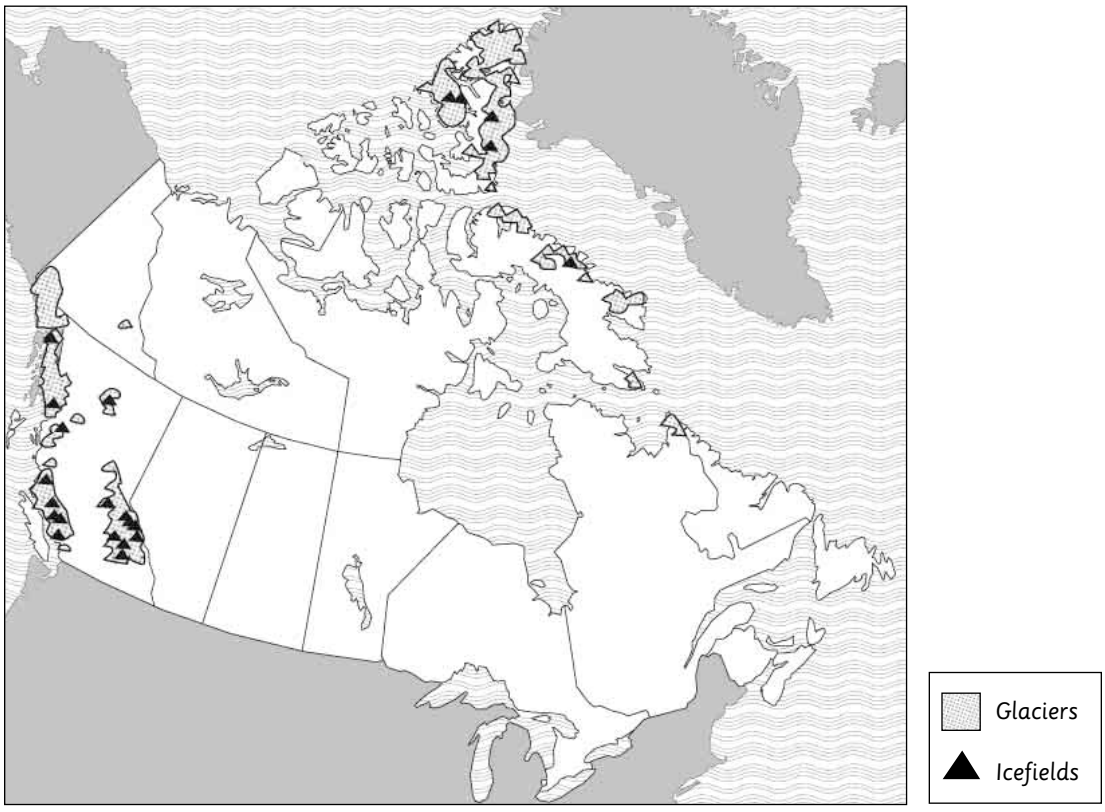
v) Even the most arid (dry) parts of Canada receive enough rain to grow certain crops. Use an atlas to label the Okanagan Valley on your map.

Name: _____

vi) Do some research to find out what crops grow in the Okanagan Valley. On the table below, draw some of the delicious foods that we harvest from the Okanagan.



2. Icefields and Glaciers



Source: Environment Canada

Name: _____

i) What is a glacier?

ii) Do some research on icefields to determine the difference between a glacier and an icefield.

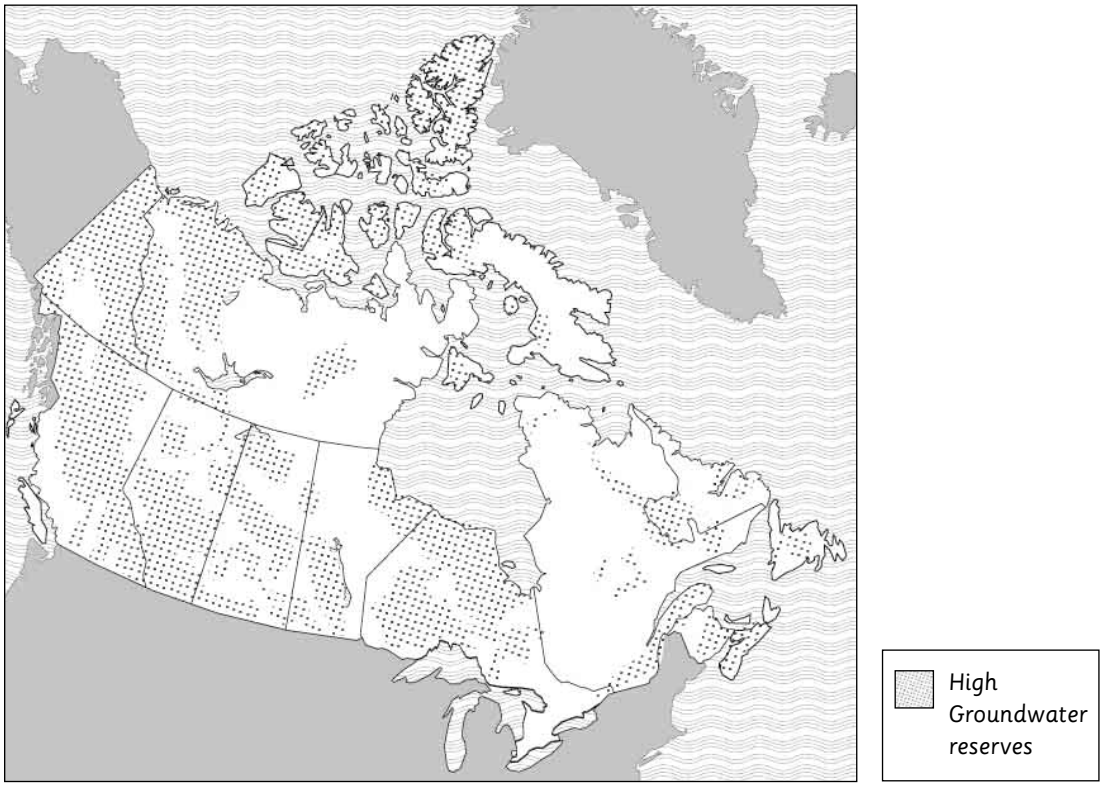
iii) About 10 percent of the Earth's surface is covered in glaciers. About 2 percent of Canada is covered in glaciers, meaning we are rich in glacier water. However, most of those glaciers are located in a few provinces and territories. Name them.

iv) Even though glaciers are frozen, they are still an important part of Canada's fresh water supply. Do some research and explain.

v) How is global warming affecting the glaciers in Canada?

Name: _____

3. Groundwater



Source: Environment Canada

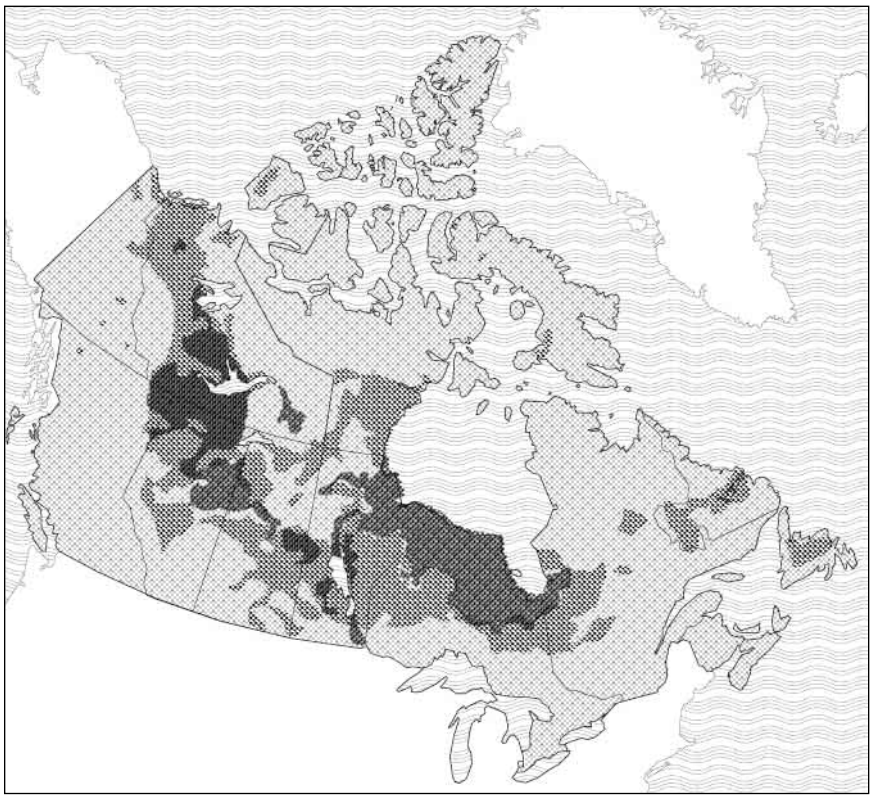
i) Groundwater is water found under the Earth's surface. In Canada, there is more water underground than there is on the surface. Do some research to explain how Canadians use groundwater.

Name: _____

ii) Now, explain how groundwater is an essential part of the ecosystem for other animals and plants in Canada.

Name: _____

4. Wetlands



Source: Environment Canada

i) Which provinces and/or territories are home to the most wetlands in Canada?

_____

_____

ii) What are wetlands? What are a few different types of wetlands? Do some research and find out.

_____

_____

_____

_____

Name: _____

iii) *Wetlands are often called "the kidneys of the landscape". Explain why they are given this title.*

iv) *Why is Canada losing its wetlands at such a rapid rate?*

Name: _____

v) *Draw and name one bird, one mammal, one amphibian, and one insect that rely on the wetlands in Canada, and explain why their survival depends on these areas.*

Bird

_____

_____

_____

_____

Mammal

_____

_____

_____

_____

Amphibian

_____

_____

_____

_____

Insect

_____

_____

_____

_____

Canon

Name: _____

5. Rivers and Lakes

   Complete the instructions below on the following map:

   i) Label and colour the Great Lakes blue.

   ii) Label and colour the following rivers green: Mackenzie, Fraser, Peace, Athabasca, Liard, Miramichi, Columbia, Churchill, Three Rivers, Nelson.

   iii) Label and colour the St. Lawrence Seaway red.

   iv) Label and colour the Niagara River and Niagara Falls orange.

   v) Label and colour the following lakes yellow: Great Slave, Winnipeg, Great Bear, Wollaston.

   vi) Which one of these rivers is the longest river in North America, and the ninth longest river in the world?

   _____

   vii) Which one of these lakes is the second largest lake in the world?

   _____

Name: _____

Rivers and Lakes

Canon

Name: _____

Section C) A Water Community

Communities are often built near lakes, rivers and oceans. In Canada, First Nations people built most of their communities closest to the most available body of water – as a source of drinking water, food, and to make travel and trade easier. When European explorers first arrived in Canada, they too took advantage of our water systems. Our rivers and lakes became their highways across Canada. Along these routes, both First Nation and European communities grew and thrived.

Each community, or settlement, grew differently. Some were built along rivers, others around a harbour, lake, or central water source. Some seemed to grow in no recognizable pattern at all, but all were affected by access to water. No water equaled no settlement.

Settlement patterns can be classified into three types:

Linear: *a settlement that follows a natural or man-made line, for example, a river or road.*

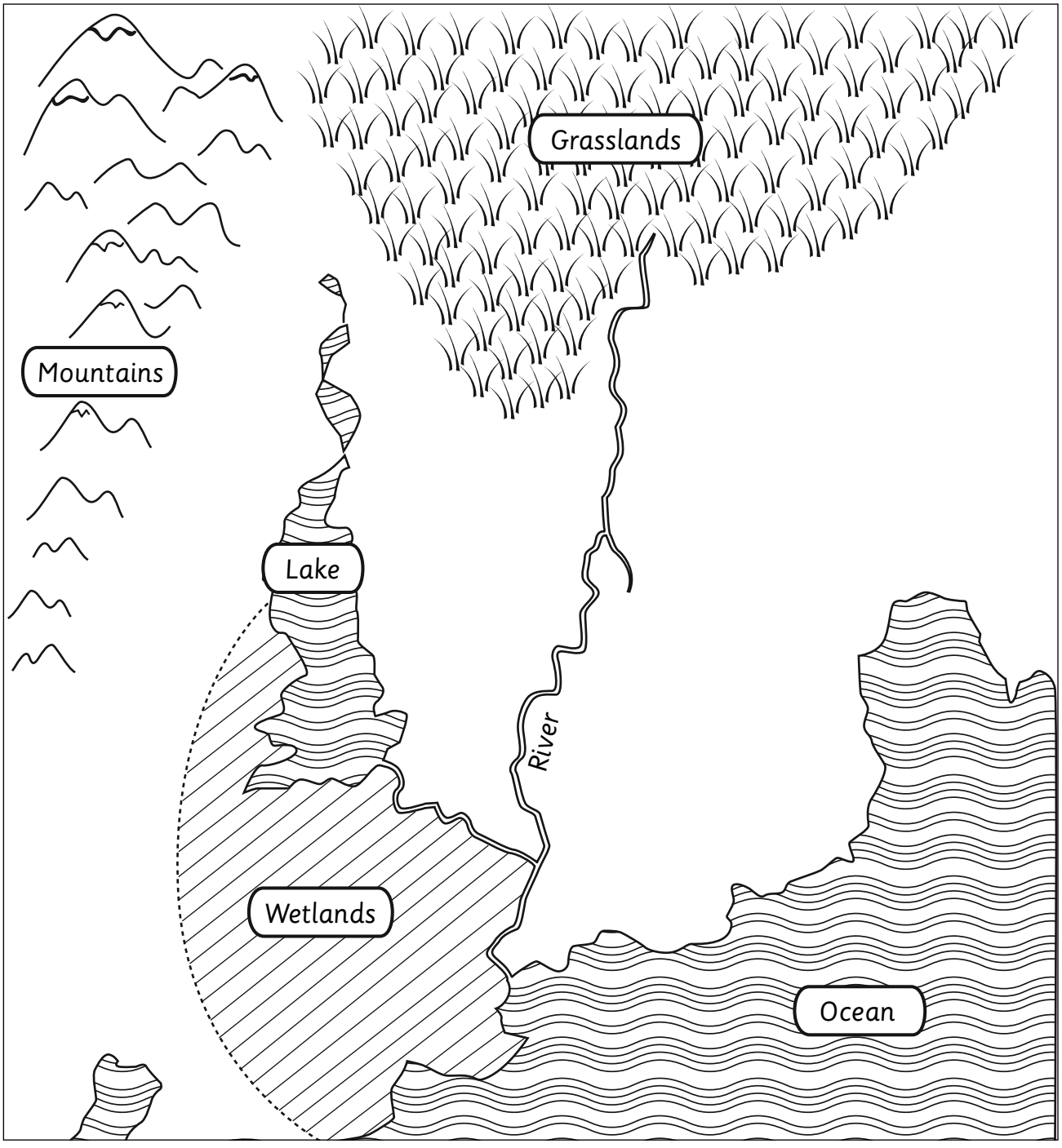
Clustered: *a settlement that encircles or surrounds a natural or man-made point; for example, a lake, harbour or mine.*

Scattered: *a settlement where there is no pattern to development.*

Using the maps on the following page, illustrate what you think a linear settlement and a clustered settlement would look like, and where they would be built. Use the water and land features as your clues.

Name: _____

1. Linear



Name: _____

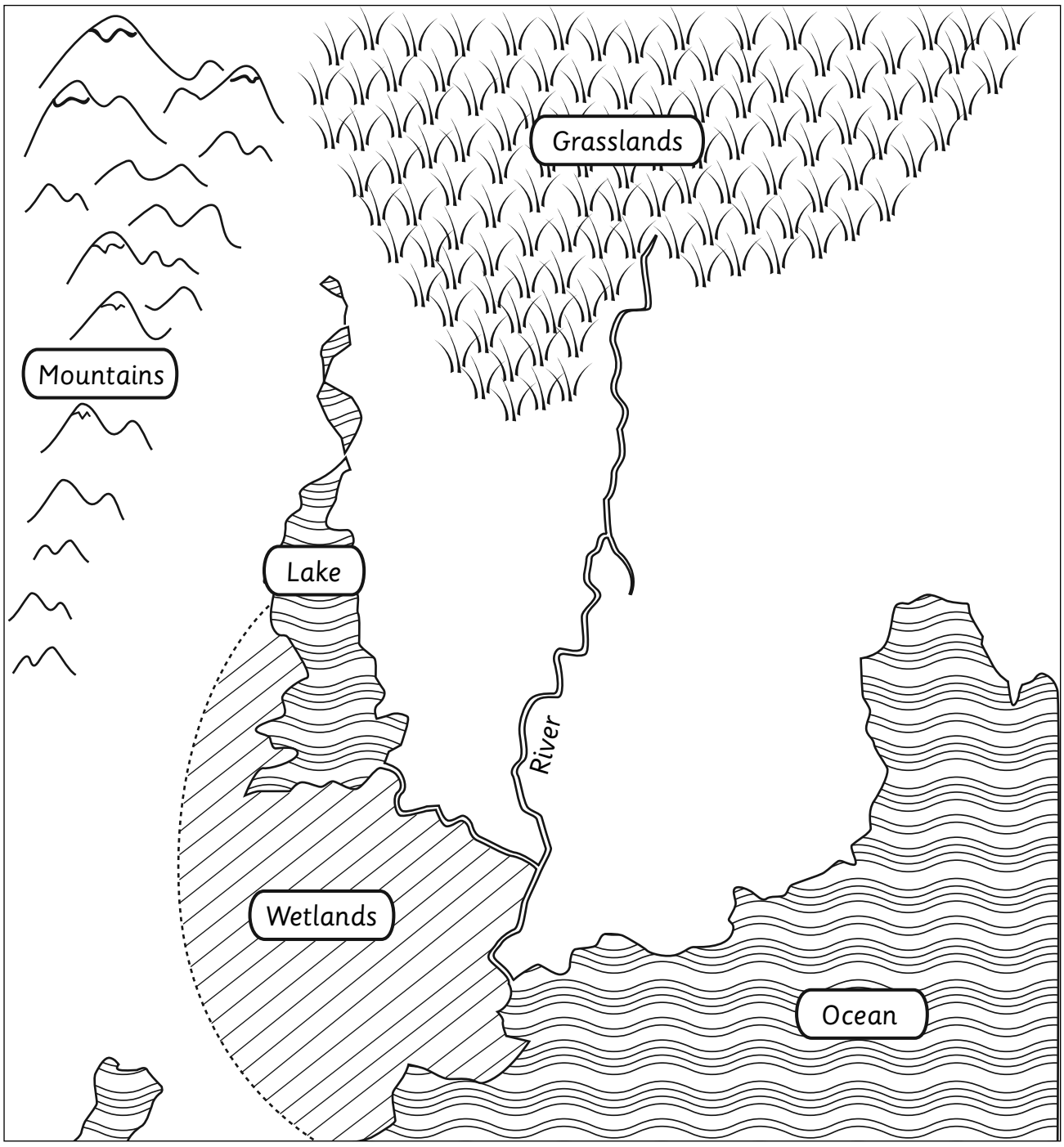
i) What geographical factors did you consider when you chose a location for your town?

ii) What industries do you think would do well in this location?

iii) Use a map to identify a Canadian city that has a linear settlement:

Name: _____

2. Clustered



Name: _____

i) What geographical factors did you consider when you chose a location for your town?

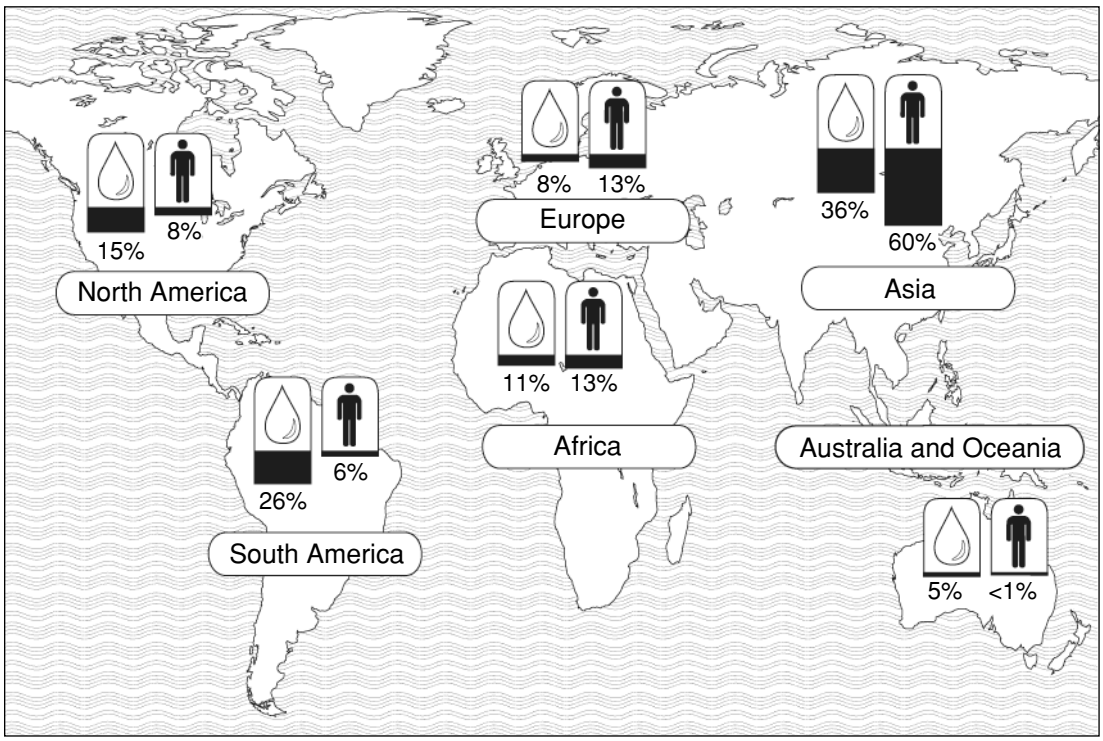
ii) What industries do you think would do well in this location?

iii) Use a map to identify a Canadian city that has a clustered settlement:

Answers: Mapping Our Water

Section A) Global Distribution of Salt Water vs. Fresh Water

3.



Source: Environment Canada, 2004

i) 15%

ii) 8%

iii) 11%

iv) 13%

v) North and Central Americans have more water per person than Africans.

vi) North and Central America, South America, Australia and Oceania.

vii) Europe, Asia and Africa.

viii) Asia.

ix) South America.

Canon

Answers: Mapping Our Water (continued)

4. i) Open – Not very efficiently. They have so much that they lose awareness of its value. The monetary cost of using water may also be low (i.e. cheap).

   - Leave taps running.
   - Take long showers and lots of baths.
   - Flush garbage in the toilet.
   - Use water to irrigate large, decorative lawns and often.
   - Use recreational powerboats and jet skis.
   - Dump industrial pollutants into the water thinking we have more than enough to dilute it.
   - Fill in wetlands to make way for farms, cities and other human projects, and then build expensive, energy-consuming water filtration plants to clean water.

   ii) Open – More efficiently because they are aware of its value. They would not waste what they don't have enough of.

   - Often, those who use over a certain amount of water have to pay for it. The monetary cost of using water may be high (i.e. expensive).
   - Reuse wash water.
   - Take short showers and baths with tub only half filled.
   - Water crops at night when there is no sun (low evaporation rate), and only when necessary.
   - Irrigate plants underground rather than spraying them (less runoff and less evaporation).
   - Install low-flow toilets and shower heads.
   - Do not leave taps running.

   iii) Open – Student should be aware of how much water we waste, and how we take water for granted by overusing it, polluting it and filling in wetlands.

Canon

Answers: Mapping Our Water (continued)

Section B) Researching Canada's Water

1. Precipitation in Canada

   i) British Columbia.

   ii) Alberta, Manitoba, Nunavut, Ontario, Quebec, Newfoundland.

   iii) The Rocky Mountains shelter the eastern part of British Columbia from rain. This is called a rain shadow. Moisture from the Pacific Ocean rises and cools in the mountain air, and falls on the western side of the slopes, instead of on the prairies to the east.

   iv) Canada's prairie provinces are areas of rich farmland. They get a moderate amount of rainfall.

   vi) Peaches, apples, grapes.

2. Icefields and Glaciers

   i) Open:

   - A glacier is a large, long-lasting river of ice and compacted snow that moves slowly in response to gravity and its own heavy weight.
   - Large mass of frozen freshwater.
   - Glaciers are the largest reservoir of freshwater on Earth.

   ii) Open – They are similar. However, a glacier tends to move on a downward slope, while an icefield is flatter, and runs off in various directions.

   iii) British Columbia, Northwest Territories, Nunavut, Yukon.

   iv) Open – Glacier runoff feeds clean, fresh water to groundwater, rivers, lakes and streams. It also keeps the water cycle flowing, providing drinking water to many communities and ecosystems.

   v) Open – As the Earth's average temperature increases, glaciers melt. Melting glaciers change the water cycle and sea levels around the world, causing flooding in some areas and droughts in others. Glaciers also help to regulate the Earth's temperature by reflecting sunlight back into space (high albedo) and thus promote cooling. As more glaciers melt due to global warming, darker surfaces capable of absorbing more solar energy are exposed. This contributes to further warming, which in turn causes more glaciers to melt and consequently creating a positive feedback cycle.

Answers: Mapping Our Water (continued)

3. Groundwater

   i) Open:

   - 30 percent of the Canadian population relies on groundwater to supply fresh water to their homes (through pumps and wells). For instance, all of Newfoundland and 60 percent of New Brunswick rely on groundwater for domestic use.
   - In many rural areas, wells extracting groundwater produce more reliable and less expensive water supplies than lakes or rivers.
   - We also use groundwater for crop irrigation, livestock watering, aquaculture, and mineral and hydrocarbon extraction.
   - Groundwater is filtered through wetlands, which act as a natural filtration plant, helping to keep our water supply clean and drinkable.

   ii) Open:

   - Groundwater feeds Canadian lakes, streams and rivers that thousands of plants and animals rely on as habitats.
   - As groundwater is filtered through wetlands, it also provides clean water to plants and animals.
   - Groundwater is the source of water for many wetlands, which serve as important habitats for plants and animals, such as ducks and other waterfowl.

4. Wetlands

   i) Ontario, Yukon, Northwest Territories, Alberta, Manitoba, Saskatchewan.

   ii) Open:

   - Areas where land and water meet and the land stays wet or submerged for part or all of the year.
   - They often border lakes, rivers, oceans.
   - They are fed by lakes, rivers, ocean tidal flows, or groundwater.
   - Wetlands may be temporary flooded spots, or permanent, like large ponds.
   - Types of wetlands include ponds, marshes, fens, swamps, bogs, mudflats, etc.

Answers: Mapping Our Water (continued)

iii) Open:

- Wetlands filter sediment and pollution from water, acting as a natural filtration plant that provides clean, drinkable water to plants, humans and other animals. Our kidneys filter toxins and wastes from the blood in our bodies.
- They are also a critical part of the water cycle that keeps water circulating around the world.

iv) Open:

- In the past, we didn't understand the critical role that wetlands play in water filtration, reducing erosion and by being a habitat for many species. We often drained them or filled them in thinking they were festering, dirty places that have no use.
- As the population grows, we take up more and more space for cities, farms and other human development. To do so, we often drain or fill in wetlands as potential sites for human development.

v) Open:

Birds:

- Whooping crane, Canada geese, trumpeter swan, sandpipers, gulls and other migratory birds rely on them as seasonal habitats and breeding grounds.
- Kingfishers, owls and ospreys live near and feed in wetlands.

Mammals:

- Muskrats, beavers, mice and rabbits all live in or near wetlands.
- Bears, caribou, deer, moose, wolves and foxes all live near wetlands as a source of drinking water and feed on plants or animals that live there.

Amphibians:

- Frogs, salamanders and toads live, breed and feed in wetlands.

Insects:

- Mosquitoes, dragonflies, and mayflies hatch from larvae that grow in wetlands.
- Many butterflies feed on plants that border wetlands.
- Water striders and other water bugs and beetles live, eat and breed in wetlands.

Answers: Mapping Our Water (continued)

5. Rivers and Lakes

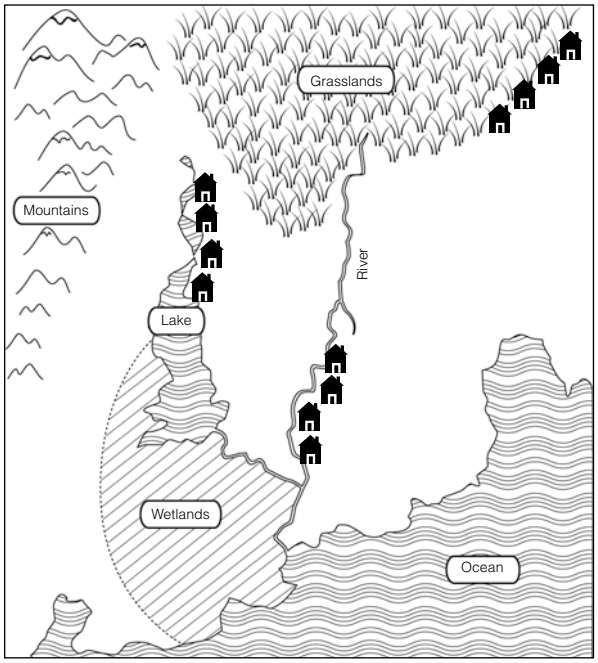
vi) The Mackenzie River.

vii) Lake Superior.

Answers: Mapping Our Water (continued)

Section C) A Water Community

1. Linear *(diagram shows various options for linear settlements)*



i) Open:

- Alongside a river (or road).
- Not on the wetland side.
- Not at junction or harbour.
- Maybe near grasslands to grow crops.
- Maybe near another large body of water like lake, or major waterway (ocean).

ii) Open:

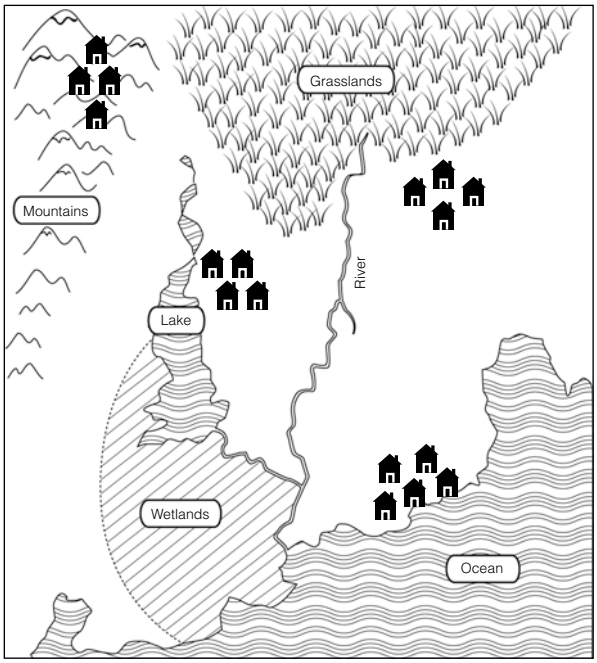
- Trade that requires shipping, forestry (log transport), mining, etc.
- Mills and factories that use fast moving water as a source of power.
- Hydro power.
- Tourism and recreation business.
- Agriculture that could use water for irrigation.

iii) Open:

- Could be Ottawa, Vancouver, Quebec City, etc.

Answers: Mapping Our Water (continued)

2. Clustered *(diagram shows various options for clustered settlements)*



i) Open:

- Near grasslands for farming.
- Near lake for water, fisheries, tourism and recreation business.
- In the mountains (alpine town) for tourism and mining.
- Near the ocean (not in wetlands) as a port for shipping, for fisheries and tourism.

ii) Open:

- If grassland, agriculture.
- If ocean, shipping and trade, fisheries, tourism.
- If lake, fisheries, tourism and recreation business.
- If mountains, tourism and mining.

iii) Open:

- Could be Toronto, Montreal, Calgary, etc.