The Winds of Change:
Climate Change in the Prairie Provinces

Group Members: _____
                _____
                _____
                _____
                _____
                _____

Trivia Challenge: Search the entire poster to find answers for the following:

1. When was most of Canada covered with ice?

2. What is the current land cover around Uranium City?

3. What landmark is seen in the picture of a city?

Did You Know? Use the pieces of information under this heading ("Did You Know?") on the poster to answer the following true/false (T or F) questions. If the statement is false, cross out the incorrect word or number value, and write in the correct version.

___ Nearly 40% of Albertans live in either Calgary or Edmonton.

___ Almost half of the population of Saskatchewan lives in rural areas.

___ About 10% of Regina relies on groundwater for its water supply.

___ There are more than 5000 glaciers in the eastern Rockies.

___ The 1980's were the warmest decade of that century.

___ Most forest fires in Canada are caused by careless campers.

___ The hottest temperature ever recorded in Canada was 45 ºC on July 5, 1997.

___ The most expensive weather-related disasters are tornadoes.

___ Every litre of gas used in your car produces about 5 kg of CO_2.

___ The Calgary hailstorm of 1991 lasted for 15 minutes!

Climates Do Change:

1. When was the last time most of Canada was covered with ice?

2. Examine the 3 graphs:
   a) Graph 1: What does the graph depict climate to have been like in:

      1. 8000 BC?

      2. 4000 BC?

      3. The last 500 years?

   b) Graph 2:
      1. What does the graph show for several hundred years before 1980?

      2. What happened to the Rockies during this period of time?

   c) Graph 3:
      1. Describe what has happened to Earth's average temperature since 1980.

      2. What is the projected temperature rise for the year 2100?

      3. Do you think this is a realistic projection? Why or why not?

3. Examine the map showing projected summer temperatures for 2080 – 2100. By how much will temperatures in North America have increased from the 1975 – 1995 time period?

4. What might happen to temperatures south of Greenland and eastward off the Canadian Atlantic coastline?

Why is the Climate Changing Now?

1. Record the following information on incoming solar radiation:

   _____% absorbed by atmosphere
   _____% reflected by atmosphere
   _____% absorbed by Earth's surface
   _____% reflected by Earth's surface

2. What are the 2 most important greenhouse gases? _____ & _____.

3. If there were no GHGs, what would not be possible on Earth?

4. Examine the graph showing atmospheric CO_2 concentrations, and describe what occurred after the Industrial Revolution.

5. What specific human activities are responsible for the rapid build-up of CO_2 in our atmosphere?

6. Summarize how the carbon cycle maintains balance on Earth by listing all factors involved in the capture and release of this element.

7. Where is most of Earth's carbon stored?

8. How many billion tonnes of carbon are stored in fossil fuels?

9. What are the "big three" GHGs we're concerned about?
   a)

   b)

   c)

How Are Climates Changing in the Prairies?

1. Despite the warming trend depicted in the Prairie temperature graph, what is also apparent on a year-to-year basis?

2. By how much has the yearly average temperature increased over the last 50 years?

3. What province is particularly susceptible to drought?

4. What will this mean to farmers there?

Melting Glaciers:

1. What will be affected by retreating glaciers?

2. Examining the graph for glacier-fed stream flow, when is the peak time for glacial melt runoff?

3. What fish may already have been impacted by a reduction in glacial-derived flows?

Water Resources:

1. Check off all of the following that **apply** to groundwater:

    _____ A good alternative source of water throughout the prairies
    _____ Provides an unlimited source of water
    _____ Is a renewable resource
    _____ Can become contaminated, and not safe for use
    _____ Is used for irrigation on the prairies
    _____ Provides many residences with all of their water needs

2. Examine the diagram showing Calgary. If you were to develop a management/conservation program for this city's water supply, what would you take into consideration?

Changing Vegetation:

1. Looking at the 2 maps of prairie vegetation, present and future, what is projected to happen to the percentage ground cover of:

    a) Grasslands?
    b) Aspen parkland?
    c) Boreal forest?
    d) Foothills forest?
    e) Subarctic?

2. Write a short story describing what might happen to you if you were a tree in a prairie forest.

"Hi. I am _____....."

3. Comment on the usefulness of satellite images for detecting forest fires.

Rivers in Flux:

1. Will all rivers be affected in the same way as climate warms?

2. Of the 4 types of rivers listed, which one will have an impact on Winnipeg, and how might we be affected?

3. Answer the following regarding the Red River Flood of 1997:

   a) The cost?
   b) Number of military personnel?
   c) How many people evacuated?
   d) What kind of protection saved most towns south of Winnipeg?
   e) What did Morris, Manitoba look like?
   f) How were members of your group affected by the flood?

4. Examine the graph.
   a) How many years from the period 1892 – 1945 had flows over 2000 m^3/s? _____
   b) How many years from 1945 – 1999 had flows over 2000 m^3/s? _____
   c) Predict what a graph showing the next 50 years might show, explaining your prediction.

Extreme Weather:

1. What are the specific extreme weather events that cause death and destruction on the prairies?

2. Rank your list in question 1 above in order of the risks to the citizens of Winnipeg.

3. Examine the graph showing costs of weather-related disasters. How do the last 20 years appear different out of the last 70 depicted?

4. What do you think the effect of this trend will be on insurance rates/premiums?

5. Have you personally been affected by extreme weather? If so, how?

How Do We Measure Up?

1. From the graph, rank the following nations (1 – 9) according to their CO_2 emissions:

Canada	____	U.K.	____	India	____
Russia	____	China	____	Italy	____
Japan	____	Germany	____	U.S.	____

2. How many citizens of India output CO_2 equivalent to a single Canadian? ____

3. What activity is responsible for the greatest output from individual residences?

4. What activities produce the 75% of GHGs not produced by residences?

Life in the North:

1. What animals are vulnerable to changes in sea ice, and why are the females particularly vulnerable?

2. What is permafrost?

3. What will be affected if the permafrost melts with a warming climate?

4. Examine the 2 prairie maps.
    a) Currently, approximately what percentage of the prairies has some permafrost?

    b) Approximately what percentage does the future map depict?

Life in the Prairies:

1. How might a person living in a prairie city be affected as climate warms?

2. How might a person living in a farming community be affected as climate warms?

Let's Meet the Challenge:

1. Pretend your group is the Federal department responsible for deciding what will be done on the prairies to address climate change issues. Make a list, from higher to lower priority, of what you will do to initiate changes (i.e. YOU decide the future).