The Tides of Change:
Climate Change in Atlantic Canada

Group Members: _____

_____

_____

_____

_____

_____

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

1. What province is Saint John located?
   New Brunswick

2. What is meant by the term "blowdown"?
   A lot of trees felled in a storm

3. What "distinguishing" features does a Harlequin Duck have?
   White stripes/markings

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. (10)

___ Cod travelled northwards between 1900 and 1920, but after 1930 they retreated southwards. **T**

___ Changes in water temperature affect ~~only a few~~ species in the marine food web. **F, all**

___ A ~~20 – 30~~% reduction in present global emissions of CO_2 would be required to stabilize atmospheric CO_2 concentrations at current levels. **F, 50 – 60%**

___ Canada's emission reduction target under the Kyoto Protocol is ~~3~~%. **F, 6%**

___ ~~100~~% of Atlantic Canada's fog comes from outside the region. **F, 75%**

___ Venus has an atmosphere of ~~75~~% CO_2. **F, 98%**

___ The climate between 1000 and 1200 A.D. was very similar to today's. **T**

___ The "Little Ice Age" began in the 1200's and ended in the ~~1500~~'s. **F, 1800's**

___ Temperatures on Venus reach 430 ºC. **T**

___ Canada has about ~~4~~% of the world's population, but produces 2% of global CO_2 emissions. **F, 0.5% of population**

Is Climate Changing?

1. What is happening to most of the world's glaciers? (1)
   Shrinking

2. What is the IPCC? (1)
   Intergovernmental Panel on Climate Change

3. Examine the Temperature Change maps. In what general areas do you see shading corresponding to the greatest temperature change? (1)
   The poles

Climate Has Always Changed:

1. How can climate be described over the past 10 000 years? (1)
   Stable

2. Answer the question in the   **Green box**
   (1)
   Examine long-term records

The Greenhouse Effect:

1. What are "the big three" GHGs (greenhouse gases)? (3)
   a) **CO_2**
   b) **CH_4**
   c) **N_2O**

2. Describe the projected rise in atmospheric CO_2 concentrations from the graph. (1)
   Quite extreme

2. According to the solar energy budget, what portion of the earth absorbs as much radiation as it reflects? (1)
   The atmosphere – reflects 25% incoming, absorbs 25% incoming.

The Air We Breathe:

1. What human activities contribute to smog? (1)
   Burning fossil fuels

2. Examine the triangle Δ, and predict the impact on health care costs if fossil fuel burning is reduced. Explain. (1)
   Reduced…

3. What activity is responsible for 26% of GHG emissions in Canada? (1)
   Transportation

Freshwater Issues:

1. Examining the 2 graphs pertaining to the Saint John River, what correlation exists between the number of mild days in January and peak daily flow? (1)
   Positive correlation

2. Answer the "?" on hydro-electric power. (1)
   Increased water flow = more power; reduced water flow with increased evaporation = less power.

Forests in Peril?

1. How do air-filled stems in hardwoods cause their demise? (1)
   Prevent water flow

2. Why might the Gypsy moth threaten Canadian forests if warming continues? (1)
   Large numbers are a threat to trees, and since the moths die at temperatures below -9⁰C, warming may not allow enough deaths.

Down on the Farm:

1. Make a list of pros and cons for farmers if global warming continues? (2)

Pros	Cons
-longer growing season; higher yields	-drought; increased irrigation $
-less loss from winter kill	-increased winter insect pests
-fall harvesting easier	-more generations of summer
-vineyards more common	pests

2. What is the greatest concern for agriculture in Atlantic Canada? (1)
   Trend toward more severe weather events

Changing Ecosystems:

1. Examining the 2 maps, comment on what a doubling of atmospheric CO_2 would do to the area, or amount of land in Canada occupied by: (3)
   a) Tundra? **Reduce by ~ 1/3**

   b) Grasslands? **Reduced to ~1/2**

   c) Temperate regions? **Increased ~ 3 to 4 times the area**

2. How will Atlantic Canada's biomes change if this is accurate? (2)
   - **The temperate forest zone will extend northward in Atlantic Canada**
   - **The existing soil conditions and life cycles will limit rates of forest migration.**
   - **Existing forests will undergo significant disruption before a new equilibrium is established.**

3. Predict what this shift in ground cover will mean for the biodiversity (plant and animal life) in Atlantic Canada? (1) **Many changes…**

How do we Measure up?

1. List the 3 levels of government involved in addressing climate change: (3)
   a) **Federal**
   b) **Provincial**
   c) **Municipal/Regional**

2. How many tonnes of CO_2 are YOU responsible for emitting each year as a Canadian citizen? (1)
   21.4 tonnes/year

3. As Canadians we emit a little more than twice as much CO_2 per capita than citizens of **Japan**. (1)

4. What country comes a close second to the U.S., who leads in global CO_2 emissions? (1) **Australia**

5. In Atlantic Canada, rank the following activities according to GHG emissions: (2)
   2 Transportation
   4 Residential
   3 Industrial
   1 Electricity Generation

The Ocean:

1. What 2 ocean currents meet in the Canadian Atlantic region? (1)
   a) **Labrador**
   b) **Gulf Stream**

2. Compare the speeds of the 2 currents: (1)
   a) Labrador – 1 km/h
   b) Gulf Stream – 15 km/h

3. How large would cod caught in waters with bottom temperatures of 6ºC compare to those caught in warmer or cooler waters? (1)
   Average

4. What factors need to be considered when predicting average future fish stocks? (2)
   Fishing/quotas, habitat change/food supply, change in predators…

Rising Sea Level and Vanishing Coasts:

1. What is the projected tidal water level (m) for the year 2100? How does this compare to today? (1)
   2.0 m, .6 - .7 m over today's 1.3 – 1.4 m

2. What specific types of coastal areas will be most affected by sea-level rise? (1)
   Salt marshes, lagoons, etc.

Storm Surges and Coastal Flooding:

1. What is a storm surge? (1)
   A rise in water level on the coast (from a storm)

2. What P.E.I. city was flooded by a storm surge January 21, 2000? (1)
   Charlottetown

3. Answer the "?" regarding protection. (1)
   Dykes, seawalls, etc.

Sea Ice and Icebergs:

1. What will happen to sea ice with global warming? (1)
   It will become thinner, and less extensive

2. What is predicted to happen to the southern limit of iceberg travel? (1)
   Move northward

3. When did the Titanic sink? (1) **1912**

4. Answer the "?" regarding icebergs. (1)
   Because the salt does not freeze with the water, and is left behind in the water.

Bonus Question: *What is the spelling error in this frame?* **effect → affect**

Let's Meet the Challenge:

1. How can YOU help to reduce greenhouse gases? (1)
   Public transit, car pool, bike, walk…

2. Brainstorm in your group, and list ideas to reduce our GHG emissions in Canada: (1)