

**Weathering the Changes:
Climate Change in Ontario**

Group Members: _____

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

1. Approximately how many kilometres separate Ottawa from Toronto?
~350 km
2. What insect vector (carries and spreads disease) is diagrammed on the poster?
mosquito
3. What is a “walking school bus”?
A program for parents walking kids to school

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)

- ___ Canada’s per capita water use is the ~~fifth~~ highest in the world. **F, 2nd**
- ___ Every litre of gasoline you use in your car produces almost 4 kg of CO₂. **F, 2.5**
- ___ “Jackrabbit” starts consume about ~~25%~~ more fuel than if you accelerate gradually. **F, 50%**
- ___ Cold-water fish species such as lake trout, may disappear from southern Ontario as their habitat changes. **T**
- ___ Every year in Ontario, about ~~1000~~ forest fires destroy over 290 000 hectares of forest. **F, 1500**
- ___ Using cold water to wash and rinse our clothes saves up to 225 kg of CO₂ per year. **T**
- ___ Replacing one frequently used regular light bulb with an energy efficient compact fluorescent bulb will save 100 kg of CO₂ per year. **T**
- ___ 1/3 of the CO₂ emissions generated from human activities comes from transportation. **T**
- ___ The Great Lakes region is home to ~~25%~~ of Canada’s industries. **F, 45%**
- ___ Venus has an atmosphere that is ~~98%~~ CO₂, with temperatures around ~~200~~ °C. **F, 430°C**

The Climate System – A Balancing Act:

1. What 5 elements balance our climate? (2.5) **Sun, atmosphere, oceans, precipitation/water, land.**
2. Examining the graph showing global temperature change over 10 000 years, when was the greatest change recorded? (1) **Recently, and ~4000 BC**
3. When did the Little Ice Age take place? (.5) **~1200 – 1850**
4. What is the projected temperature change by the year 2100? (1) **Over 4°C**
5. What was the Toronto area like ~20 000 years ago? (1) **Under 900 m of ice!**
6. Record the following percentages of incoming solar radiation: (2)
23% absorbed by atmosphere
25% reflected by atmosphere
46% absorbed by Earth's surface
6% reflected by Earth's surface
7. Without greenhouse gases in our atmosphere, what would our planet be like? (1)
33°C colder
8. What are “the big 3” GHGs? (1.5)
a) **CO₂**
b) **CH₄**
c) **N₂O**
9. Which GHG is produced by landfills and wetlands? (1) **CH₄**
10. What information can ice cores provide? (1) **The gases, and thus temperatures going back tens of thousands of years.**

Future Climate:

1. What is the current concentration of CO₂ in our atmosphere? (1) **~360 ppm**
2. Extrapolating from the graph, when will you expect the amount of CO₂ in our atmosphere to double today's levels? (1) **~2060 - 2070**
3. What is predicted to happen along with climate warming in Ontario? (1) **The frequency and severity of extreme weather events may increase.**
4. What is a GCM? (1) **Global Climate Model is a computer simulation for predicting future climate.**
5. Examining the global map, what regions are expected to have the most significant temperature changes? (1) **Poles**

Where We Live:

1. Discuss in your group how YOU will be affected by a warmer climate. Describe several ways. (1)
2. Are storms such as thunderstorms expected to become more or less severe with climate warming? (1) **More**
3. What might have changed (other than the climate) that may have contributed to an increase in the number of climate-related disasters? (1) **Populations more concentrated, building design (e.g. high rises, etc.)**
4. How many households in total lost power in the January 1998 ice storm? (1)
~1 million
5. Calculate the costs of the ice storm from the transmission tower and wooden utility pole damage. (1.5)
 $(130 \times 100\,000) + (30\,000 \times 3000) = 91\,300\,000$, or 9.13×10^7

Our Health:

1. What climate factors affect our health? (1)
Temperature, humidity, pressure
2. How many more hot days over 35°C in southern Ontario are expected (compared to today), by the middle of the next century? (1) **By 36 (from 10 to 46)**
3. How do certain microclimates, such as those found in cities, differ from the surrounding region? (1) **Warmer – pavement / buildings absorb heat.**
4. What impact will warmer daytime temperatures have on smog? (1)
Increase it
5. What gas is mapped by concentration in southern Ontario? (1) **Ozone**
6. Around which 2 Great Lakes is the concentration of this gas (from question 5 above) the highest? (1) **Erie, Michigan**
7. Would an outdoor summer job in the Lake Erie area be desirable? Why or why not? (1) **Potential lung damage**

Our Water:

1. What looks strange in the Macey's Bay picture of May 15, 2000? (1)
Docks, no water
2. What concerns arise when water supplies are warmer? (1)
Water quality – microbes and algal blooms

3. List all of the water movements/exchanges outlined in the hydrological cycle:
(2)
Evaporation, transpiration, condensation, precipitation, surface runoff, groundwater flow, stream flow.
4. Lower water levels will decrease shipping costs. (.5) True or **False**?
5. Typically, how much more water does the average household use for flushing toilets than for drinking and kitchen use? (1)
3x

Our Farms:

1. Make a list of the pros and cons of climate warming for farmers in Ontario: (2)

<u>Pros</u>	<u>Cons</u>
- longer growing season	- more irrigation required
- increased yield of certain crops	- winter crop damage
- the potential for growing specialty fruits and vegetables	

2. In reviewing these lists, do you think the farmers will benefit, or suffer economically?
(1)

Our Forests:

1. Pretend you are a pine tree in Ontario. Write a short story of how you will be affected by climate change. (2)

“Hi. I am _____, a pine tree in Ontario....”

Our Natural Heritage:

1. What 3 nutrients are exchanged between air, plants, and animals in any ecosystem, as diagrammed? (1.5)
- O₂**
 - CO₂**
 - H₂O**
2. Write “W” for warm-water fish, or “C” for cold-water fish beside each fish below: (2)
- C** lake trout
 - W** black bass
 - W** white perch
 - W** sunfish
 - C** lake whitefish
 - W** white bass

3. What is the problem with large populations of snow geese? (1)
Their spring feeding frenzy destroys marshes

How Do We Measure Up?

1. Rank these countries (1 – 9) by 1995 CO₂ emissions: (2)

Canada	2	Italy	7	India	9
U.K.	5	China	8	Russia	3
Japan	6	Germany	4	U.S.	1

2. Look at the house and car. Can one family make changes that can make a difference? Explain. (1)

Where Do We Go From Here?

1. How many nations originally negotiated the Kyoto Protocol? (1)
160
2. Are we capable of changing for the future as a nation of individuals? Brainstorm with your group to generate ideas of what students in your school could do to “meet the challenge” (i.e. the walking carpool) (1)