Name: _____

- **Please hand in the lab as ONE PDF document on Moodle.**
- **Please make sure the pages are in order**
- **Please make sure it's legible (open your PDF file to double check 😊)**
- **Thank you**

CRANDALL UNIVERSITY
GEOGRAPHY 1023
Lab 6: Weather & Water Resources

Reference: *Chapters 8, and 9 … text and notes.*

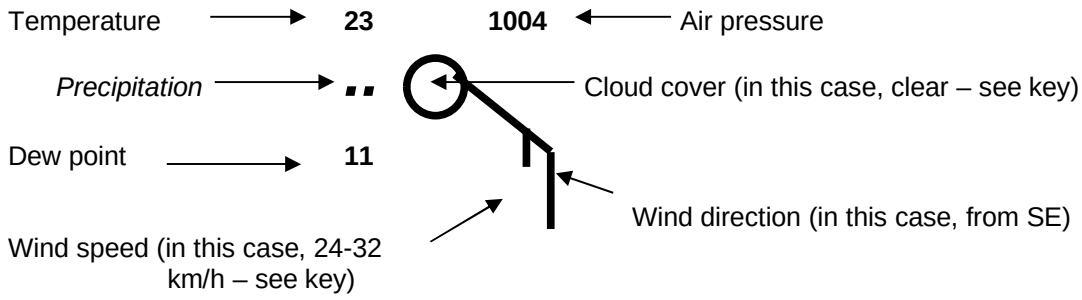
This lab continues to look at weather – the short-term, day-to-day condition of the atmosphere – and some of the principles of meteorology – the scientific study of weather. We will also look at the hydrologic cycle (Chapter 9)

I. Air Masses and Weather Maps

For this section you will need to refer to 4CE Geosystems in Action 8, pp. 218-219 (3CE Figure 8.12, "Idealized Stages …" p.208). If it is not in your textbook (some online texts do not have it), I have posted it on the LAB page of the website: https://rossway.net/p-218-2/

- *Note this is a hypothetical weather. Current weather maps are available at http://www.weatheroffice.ec.gc.ca. These are updated daily.*

Note the weather station symbol IN THE LOWER BOX. And the key to the symbols beneath it. Locations can be described by these symbols:



- *Note that the wind direction line points in the direction the wind comes **from**. In this case the wind comes from the southeast. The little line on the wind direction line indicates wind speed, in this case 24-32 kph (in the text, km/h is on the left, miles/hour on the right – **use km/h in this lab**!). If there is no line, there is no wind!*

- *Cloud cover is shown by how much the circle is shaded in. In this case, an empty circle indicates no clouds, or a clear sky. In the example in your text, ½ is shaded, indicated 50% cloud cover.*

1. *If there is precipitation, the surrounding area will be shaded in and a word – "rain" or "snow"—will normally appear. On individual weather symbols, like this, precipitation is also indicated by the two dots (fairly heavy rain).*

For these questions, use 4CE Geosystems in Action 8, pp. 218-219 (3CE Figure 8.12, "Idealized Stages …" p.208).

1. Locate the weather station data for Regina, SK. What is:
   a. The temperature: _____°C
   b. the dew point temperature _____°C
   c. the air pressure: _____ mb
   d. the wind direction: _____ (named by where it comes from!)
   e. the wind speed: _____ km/h
   f. the cloud cover: _____
   g. the precipitation (if any): _____

2. Locate the weather station for Fort McMurray, AB. What is:
   a. The temperature: _____°C
   b. the dew point temperature _____°C
   c. the air pressure: _____ mb
   d. the wind direction: _____ (named by where it comes from!)
   e. the wind speed: _____ km/h
   f. the cloud cover: _____
   g. the precipitation (if any): _____

3. Locate the weather station data for St. John's, NF. What is:
   a. The temperature: _____°C
   b. the dew point temperature _____°C
   c. the air pressure: _____ mb
   d. the wind direction: _____ (named by where it comes from!)
   e. the wind speed: _____ km/h
   f. the cloud cover: _____
   g. the precipitation (if any): _____

4. Locate the weather station data for Vancouver, BC. What is:

   a. The temperature: _____°C

   b. the dew point temperature _____°C

   c. the air pressure: _____ mb

   d. the wind direction: _____ (named by where it comes from!)

   e. the wind speed: _____ km/h

   f. the cloud cover: _____

   g. the precipitation (if any): _____

5. On this day, the weather in each of these cities was very different! So is their geographical location in Canada!

   From what you know about *air masses* and their characteristics, which air mass (cP, mP, cT, or mT) do you think was influencing each city on that day?

   - Regina, SK: air mass (**cP, mP, cT, or mT**): _____
   - Fort McMurray, AB: air mass (**cP, mP, cT, or mT**): _____
   - St. John's, NF: air mass (**cP, mP, cT, or mT**): _____
   - Vancouver, BC: air mass (**cP, mP, cT, or mT**): _____

6. What kind of a front (**warm OR cold**) is approaching Regina from the north? _____

7. This front will pass through Regina in about 12 hours. What changes might Regina-ites(?) (Regina-ers? Reginans?) experience ***as the front passes*** through the city …

   Temperature changes (**increase/decrease/same**?): _____

   Precipitation (**will there be any? If so, what type**?): _____

   Air pressure change (**increase/decrease/same**?): _____

   Wind direction change? (if so, what is the new wind direction): _____
   (remember winds are named by where they come ***from!***)

8. Halifax, NS, and Quebec, QC, are under the same air mass. Even though both cities are under one air mass, the temperature in Halifax is much different than the temperature in Quebec (though their latitudes are similar)?

   ___ because of continentality, coastal areas are warmed by the presence of the ocean
   ___ because of continentality, inland areas tend to have higher temperatures
   ___ because inland areas, further west, experience earlier sunsets and are thus cooler

II. The Hydrologic Cycle and Soil Water Budgets (Chapter 9)

You will find it helpful to review your notes on the inputs and outputs from the hydrologic cycle. Understand the various terms and abbreviations:

PRECIP	-STRG
POTET	+STRG
ACTET	SRPL

Study the Sample water budgets in your text: "Sample water budget," 4CE figure 9.11, p.251 (3CE Figure 9.9, p.243), and "Sample water budgets for …" 4CE Figure 9.12, p. 252 (3CE Figure 9.10, p.244).

1. Consider the water budget for **Phoenix**. Note POTET and ACTET are the same January and December.

   a. Estimate the POTET for January (ACTET is the same): _____ mm

      Why is this POTET number so low compared to the summer? (choose the best answer)

      ___ in January, Phoenix receives less insolation because the sun is far south, near the Tropic of Capricorn
      ___ in January, Phoenix has a low albedo, reflecting most insolation
      ___ in January, Phoenix has much cloud cover, reflecting most insolation
      ___ in January, Phoenix is mostly frozen, resulting in low potential or actual evapotranspiration

   b. Estimate the POTET for July: _____ mm

   c. Estimate the ACTET for July: _____ mm

      Explain why ACTET does ***not*** equal POTET in July:

      ___ if ACTET = POTET in winter, it won't equal POTET in summer
      ___ there is so much moisture that ACTET is unlimited
      ___ there is not enough moisture (STRG + PRECIP) to meet the POTET numbers

   d. Which is the wettest month in Phoenix (highest PRECIP)? _____

   e. Why is there ***not*** a soil moisture surplus (SRPL) during this month, if it's so wet?

      ___ even though there is lots of rain (high PRECIP), the extra water goes into the soil as soil moisture recharge (+STRG)
      ___ even though there is lots of rain (high PRECIP), there is even more moisture evapotranspired out as ACTET
      ___ even though there is lots of rain (high PRECIP), there is very little evapotranspired out as ACTET
      ___ there is no SRPL because the ACTET exceeds the POTET

f. As climate change occurs (and virtually all scientists agree climate change is happening … they will dispute the ***causes*** [natural processes vs. human activity]), average summer temperatures in Phoenix will likely increase. What would be the consequences for POTET?

___ POTET would decrease
___ POTET would increase
___ POTET would stay the same

g. Another of the hypothesized effects of global warming is less average precipitation (PRECIP) in the US south (and the Canadian Prairies). What economic consequences do you think this might have for southern US (and Canadian Prairie) farmers?

___ less PRECIP would lead to improved crop yields
___ less PRECIP would lead to no change in crop yields
___ less PRECIP would lead to decreased crop yields

2. Look at the water budget for **Vancouver, BC** (west coast).

a. In July, what is …

- the POTET: _____ mm
- the ACTET: _____ mm
- the PRECIP: _____ mm

b. Given the very low PRECIP, explain why so much moisture evapotranspires (ACTET):

___ the extra ACTET moisture comes from runoff/surplus (SRPL)
___ the extra ACTET moisture comes from groundwater storage (STRG)
___ the extra ACTET moisture comes from all the swimming pools in Vancouver

c. In November, what is …

- The POTET: _____ mm
- The ACTET: _____ mm
- The PRECIP: _____ mm

d. What does the transition from light blue to dark blue between the curves represent?

e. Climate change models for the west coast predict wetter winters and drier summers! What might some of the consequences be for people living on the west coast?

___ in summer more floods; in winter more storms and floods
___ in summer more floods; in winter less storms and floods
___ in summer more hot, dry beach weather; in winter more storms and floods
___ in summer more hot, dry beach weather; in winter less storms and floods
___ in summer no change; in winter more storms and floods
___ in summer no change; in winter less storms and floods
___ in summer more floods; in winter no change
___ in summer more hot, dry beach weather; in winter no change