

Exercise #10 Activity

Name: _____

Air Masses

Lab Section: _____

Please show your work. If necessary please use additional paper to show work.

Air Masses

✎ 1. Fill in each numbered circle indicating which source regions are producing each type of air mass influencing North America (mP, mT, cT, cP, cA).

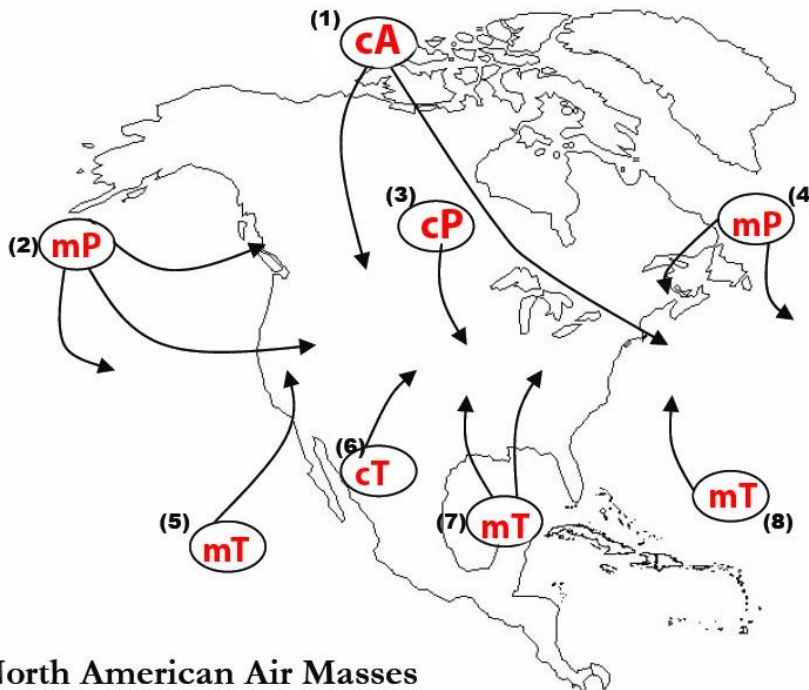


Figure 9.1 North American Air Masses

✎ Using the air masses identified in Figure 9.1 answer the following questions:

✎ 2. In the winter, what kind of weather do you think will develop over New England if air masses 3), 4) & 8) all collide over the eastern United States and why?

Air mass 3 (**cP - Cold & Dry**) will combine with the two moist air masses, 4 (**mP - Cold & Moist**) and 8 (**mT - Hot & Moist**) over New England to bring Cold temperatures into contact with moist air resulting in heavy snows over much of the region, especially at the coastal areas.

✎ 3. In the late fall and winter, when air mass 1) or 3) moves along past the Great Lakes and towards the eastern US, what kind of weather would you expect in this region to the lee (east side) of the lakes?

These areas will experience **Lake Effect Snowfall** and high amounts of snow may be expected.

✎ Explain why this phenomenon occurs.

Cold or very cold dry air moves down from Northern and/or Central Canada. As it moves over the **still warm** Great Lakes, the air mass will be warmed, and since warm air appears to increase moisture capacity, the air mass will become more moist due to evaporation over the lakes. As the air mass moves beyond the lake onto the cold land (at the far side) the air mass temperature will drop, causing the air to have a lower capacity and eventually condensation, cloud formation and snow will occur.

✍ 4. When air mass 2) arrives at the west coast of the US during late fall and winter it causes heavy RAIN at the lower elevations of the mountains and tremendous amounts of SNOW at the higher elevations.

✍ 5. Would you expect the same kind of weather in question 4 above to take place over the leeward (opposite the windward) side of the mountains? NO Explain your answer utilizing your knowledge of the adiabatic process.

The air rising up the mountain will cool adiabatically, first at the dry rate, and then once saturation is reached, at the wet rate. During this wet rate, clouds will form and precipitation (snow) will fall. This will remove much of the moisture from the air.

The air will fall down the leeward side of the mountain and warm adiabatically at the dry rate only. This will make the leeward side both drier and warmer than the original air mass.

✍ 6. Southern California often experiences very severe rainstorms during the winter. Which air mass contributes most to this occurrence?

The **mT (Hot & Moist)** air masses will be very moist and when they encounter the cooler continental (land) conditions and the air mass cools, the potential for severe rain will occur.

✍ 7. The very warm air masses of the US, along with high moisture content are the mT (Hot & Moist) air masses.

✍ 8. The hottest air mass of the US forms over the desert southwest. It is known as the cT (Hot & Dry) air mass. It develops due to very intense surface HEATING from the sun.

✍ 9. Which air mass brings New England pleasant cool days with very low humidity during the summer?
cP (Cold & Dry) air masses from Canada will bring dry conditions, and the temperatures will rise during the long journey from Central Canada so the temperature will be cool.

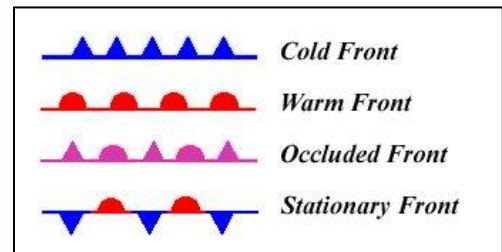
✍ 10. While on vacation you observe some high thin cirrus clouds. Later you notice that there is a halo around the sun. Gradually the clouds lower and thicken to altostratus, then nimbostratus accompanied by steady rain. Finally you observe low stratus clouds and fog. What kind of front was approaching?

You would be experiencing a **Warm Front**.

✍ 11. In the front above (question 10), warm moist air overruns the COLD air beneath it. The warm air rises slowly and is COOLED ADIABATICALLY. CONDENSATION takes place and stratified CLOUDS form.

✍ 12. A rather cold, dry high pressure system from Canada (associated with a cP air mass) moved southeastward towards the east coast of the US and came in contact with a warm, moist high pressure region (associated with a tropical maritime air mass) just off the east coast. The front that developed between them was a(n): Draw the map symbol for that front.

- a) cold front ← **COLD FRONT**
- b) warm front
- c) occluded front
- d) stationary front



✍ 13. When a COLD front catches up to a WARM front and lifts all of the warm air aloft, what kind of a front results? Draw the map symbol for that front.

- a) cold front
- b) warm front
- c) occluded front ← **OCCCLUDED FRONT**
- d) stationary front

✍ 14. The west coast experienced some very severe early winter-like weather. Heavy rains, driven by gale force winds prevailed along the west coast. The Sierras and Cascades had blizzard conditions with up to four feet of snow. What types of air mass gave them that kind of weather?

mT (Hot & Moist) air masses would bring great amounts of moisture onto the cooler land which would then cool the hot air mass, causing condensation and precipitation

✍ 15. Often New England receives nor'easters with considerable rainfall. The air masses that have supplied the needed moisture for these storms are mT (Hot & Moist) and mP (Cold & Moist) air masses.

✍ 16. Circle correct answer: Looking down on a Northern hemisphere low-pressure system (cyclone), surface winds blow [(counterclockwise and inward)] (clockwise and outward)].

