Fronts and Masses

Air Masses

An _____ _____ is a body of air that has its own temperature, humidity, and pressure. At any given time, there can be several different air masses over North America that can result in different weather in different regions.

These air masses _____ _____ and interact with each other as they move. The boundary between two different air masses is called a _____, and an approaching front usually means a _____ in weather.

Fronts

When contrasting air masses make contact, an abrupt zone or boundary is formed. This boundary is called a front and usually is accompanied by rather abrupt changes in temperature, humidity, and air pressure. These fronts are precise enough that they can be plotted on a map and their movements observed with great accuracy.

Warm Front:

When a mass of warm air moves into a region of cold air, the warm air overrides the cold air mass, forcing the cold air to retreat. This situation is called a **warm front**. The relatively lighter warm air mass forms a gentle slope over the denser cold air mass and moves forward at about 15 miles per hour. Warm fronts may be preceded by several days of high altitude cirrus clouds. The frontal surface has a gentle slope, rising only about one half mile vertically for each 100 miles of horizontal distance. Along the front, the warm, moist air rises, is cooled and forms an extensive system of stratus clouds. At the lower level the rain producing nimbostratus clouds are prevalent. Higher in altitude are the altocumulus and altostratus. The ice crystal cirrus clouds are found at heights of 20,000 to 40,000 feet. Warm fronts are characterized by several days of rain.

Cold Front:

A cold air mass moving into a warm air mass produces a frontal surface which is more vertical than that of a warm front. This situation produces a **cold front**. The slope may have a one mile rise vertically for an 80-100 mile horizontal distance. Cold air masses advance rapidly (up to 30 miles per hour) and force the warm air mass upward where it becomes cooled. The movement of the air mass may be rapid enough to produce large, towering cumulonimbus clouds. The precipitation associated with a cold front usually exists in a narrow band, is heavy, but is brief in duration. When the frontal system passes, the weather usually clears rapidly.

Stationary Fronts:

Stationary fronts exhibit little or no movement. The weather conditions are similar to those which accompany a warm front. Some light precipitation may fall.

Occluded Front:

When a warm air mass becomes trapped between two masses of cold air an **occluded front** results. The trough of warm air above the two cold air masses may rise or descend, depending on the temperature of the trailing air mass. Occluded fronts are usually accompanied by severe weather conditions.

Follow-Up Questions:

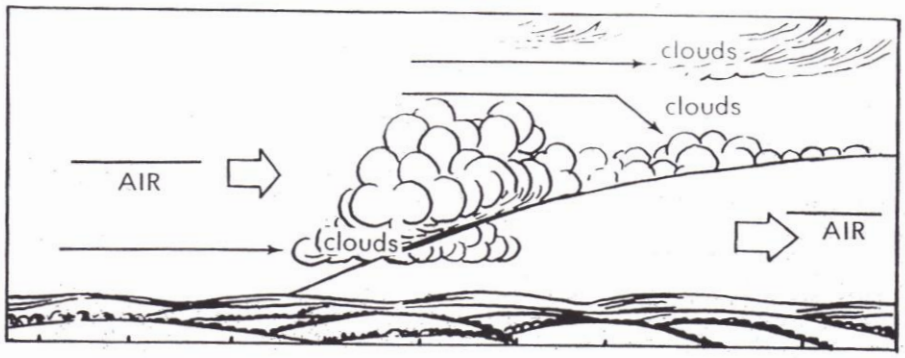
1. How does a warm front differ from a cold front?

2. Describe the weather conditions that accompany an occluded front.

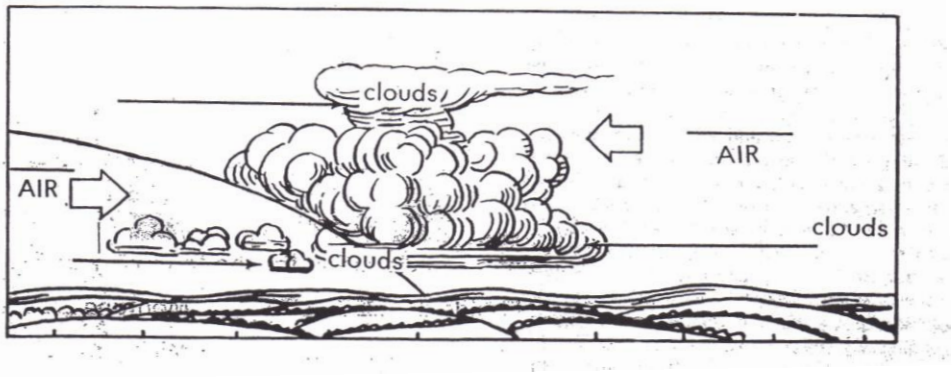
3. What is the relationship between air masses and fronts?

4. Label the types of air masses (cold/warm) and the types of clouds formed in each of the diagrams below.

Warm Front



Cold Front



1. Look at the weather map of BC below.
   a. What is the weather like in Nelson based on this map?

   b. What kinds of clouds will you expect to see in Victoria?

   c. What is the weather like in Williams Lake?

   d. What type of front is approaching Prince George?

   e. What type of clouds and weather would you expect in Prince George?