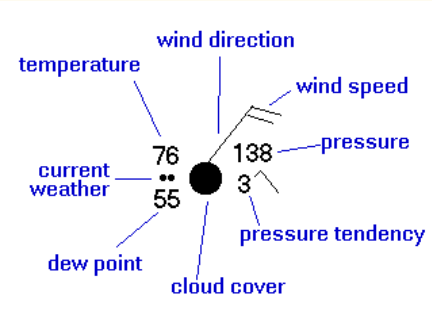
1.

What is a mid-latitude cyclone?
Mid-latitude cyclones are the result of the dynamic interaction of warm tropical and cold polar air masses at the polar front. This interaction causes the warm air to be cyclonically lifted vertically into the atmosphere where it combines with colder upper atmosphere air.

4.



7.

How would you locate fronts on a synoptic weather map?
See where there is a large change in wind direction and temperature in a small area. To locate a dry line look for a large change in humidity.

10.

Where with respect to a trough or ridge do cyclones or anti-cyclones form and why?
Cyclones typically form just ahead of a trough in the upper troposphere because this is where maximum divergence aloft occurs. When air diverges aloft, air from the surface rises to replace it, leading to a drop in surface pressure and the development of a low-pressure system (cyclone). In contrast, anti-cyclones form behind a trough or beneath a ridge, where convergence aloft occurs. This convergence causes air to sink, which increases surface pressure and creates a high-pressure system (anti-cyclone), often resulting in clear and calm weather..

13.

What kind of weather is associated with cyclones and anti-cyclones? Why?
Cyclones are associated with cloudy, rainy, or stormy weather because they are low-pressure systems. Low pressure causes air to converge and rise, and rising air cools and condenses to form clouds and precipitation. Anti-cyclones are associated with clear, calm, and dry weather because they are high-pressure systems. High pressure causes air to sink, and sinking air warms and prevents cloud formation, leading to clear skies.

2.

What is a front?
A front is a boundary between two unlike air masses. The contrasting air masses may differ in temperature and / or moisture content. Rain and clouds tend to occur near fronts due to different density air masses clashing. Symbols along the line of the front point in the direction the air mass behind the front is moving

5.

What kind of weather is associated with the passage of a front in general?
Rain and clouds tend to occur near fronts due to different density air masses clashing.

8.

What is the life cycle of a mid-latitude cyclone according to the Norweign cyclone model?
Two air masses of different densities clash and move parallel in opposite directions; a wave develops in the frontal surface; diverging air uptop and converging air at the surface; latent heat is released causing convection; cyclonic flow Is extablished and cold air moves equatorward and warm air poleward.

11.

What determines the speed of the jet stream throughout the year and how does the jet stream move throughout the year?
The speed of the jet stream is determined by the temperature difference between air masses. When the contrast in temperature between cold polar air and warm tropical air is large, the jet stream becomes stronger and faster. When that temperature difference is smaller, the jet stream slows down. The jet stream also shifts position throughout the year. In winter, the polar regions get much colder while the tropics remain warm, which increases the temperature contrast. As a result, the jet stream becomes stronger and shifts farther south. In summer, the temperature contrast weakens, so the jet stream becomes weaker and shifts northward..

3.

Be familiar with the symbols for all the fronts (there are 5) and know what kind of air mass is typically behind each front.
Warm front booties; cold front spikes; stationary front booty and spikes point in different directions but are on the same line; Occluded front booty and spikes point in the same direction and are on the same line; Dry front is a dotted line.

6.

How does the weather along or near each front differ? For example, which front brings heavier rains, ahead of which front does freezing rain tend to occur, which front remains over an area for up to a few days?

6. (cont)

Warm fronts bring moderate rain; Freezing rain in the winter tends to occur ahead of a warm front; Cold fronts bring heavy short lived rain; Stationary front brings persistent rain for days; Occluded front is when two cooler air masses catch up and push the warm air mass in between; Dryline separates air masses of different relative humidity and bring thunderstorms/torn-adoes, occurs during the summer.

9.

How does the jet stream form mid-latitude cyclones and anti-cyclones? What is divergence of air and convergence of air in reference to the jet stream?

Straight flow in the upper level winds minimizes cyclone while meandering jet stream with meridional flow maximizes cyclone development. Ahead trough is divergence which causes low pressure and cloudy weather; behind the trough is convergence which causes high pressure to develop and brings clear weather.

12.

What shape does a mature mid-latitude cyclone look like? Think of where the clouds and precipitation are clustered. Remember the animal we compared it to in class.

A mature mid-latitude cyclone has a comma shape. The clouds and precipitation wrap around the low-pressure center, forming a curved band that looks like the tail and head of a comma. This is the same shape we compared to a comma cloud or the shape of a tadpole in class.