

Name: \_\_\_\_\_ Section: \_\_\_\_\_

Atmospheric Sciences 101, Spring 2008  
Homework 6 (Due at the beginning of your section,  
Thursday May 29th or Friday May 30th)

Turn in by 4:30 PM on the due date to receive 75% of possible credit  
No assignments accepted after 4:30 PM on the due date

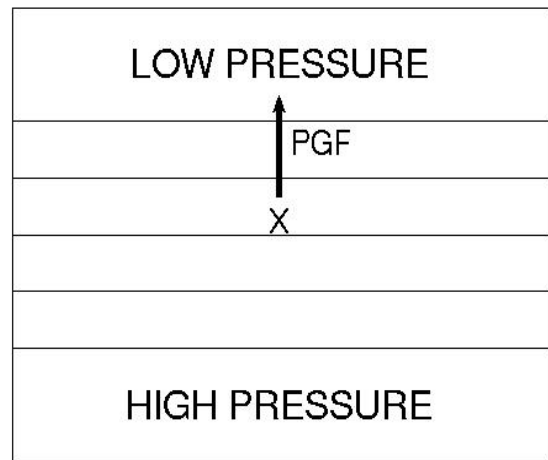
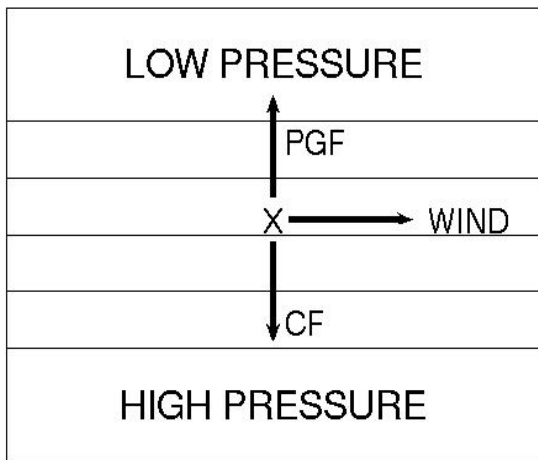
**1. Surface Winds**

A. Winds near the ground behave slightly differently than the purely geostrophic winds aloft. The influence of the force of \_\_\_\_\_ on the flow of air causes the wind to turn and blow more from \_\_\_\_\_ to \_\_\_\_\_ pressure.

B. Draw arrows on the "Near surface" diagram to illustrate the balance of forces and resulting wind direction. We have given you a head start by drawing the pressure gradient force (PGF). There will be three forces shown, compared to just two for geostrophic winds. The "Upper level" diagram is provided for comparison.

Upper Level (geostrophic)

Surface (ageostrophic)



C. Given the information in part B, draw a diagram showing how winds that **do not change speed** create convergence near the center of a low pressure system?

## **2. Convergence and Vertical Motion**

A. The convergence near the surface of a low pressure system adds mass to the air column at the center of the low, thus tending to increase the pressure and dissipate the low. Given this fact, how are low pressure systems able to intensify?

B. Why is precipitation typically associated with intensifying low-pressure systems?

## **3. Cyclone Development**

A. How do jet streams and waves in the upper level flow initiate and intensify a mid-latitude cyclone? (HINT: consider convergence and divergence in the column of air above the surface low.)

B. Where, relative to an upper level trough, is the most favorable location for the intensification of mid-latitude cyclones? If you wish, you may include a simple diagram in your answer. Is the air in the in this region aloft divergent or convergent?

#### 4. Cyclones and Heat Transfer

Midlatitude cyclones transfer heat between the subtropics and high latitudes. Draw a diagram with warm and cold fronts, a few surface isobars, and arrows showing surface winds illustrating how this heat transfer occurs. Is heat being transferred poleward or equatorward in a cyclone?

#### 5. Thunderstorms

Circle the correct term

- A. One of the ingredients for a thunderstorm is a(n) [unstable / conditionally unstable] environmental lapse rate.
- B. Single cell thunderstorms die when the [cold pool / entrainment] cuts off the buoyant [updrafts / downdrafts].
- C. Multi-cell thunderstorms avoid this fate by [vertical / horizontal] wind shear that blows the storm ahead of the [cold pool / entrained air].
- D. Storms occur most frequently over Florida because [surface heating / converging sea breezes] triggers the initial uplift necessary to lift unsaturated parcels through a [stable / unstable] layer near the surface.