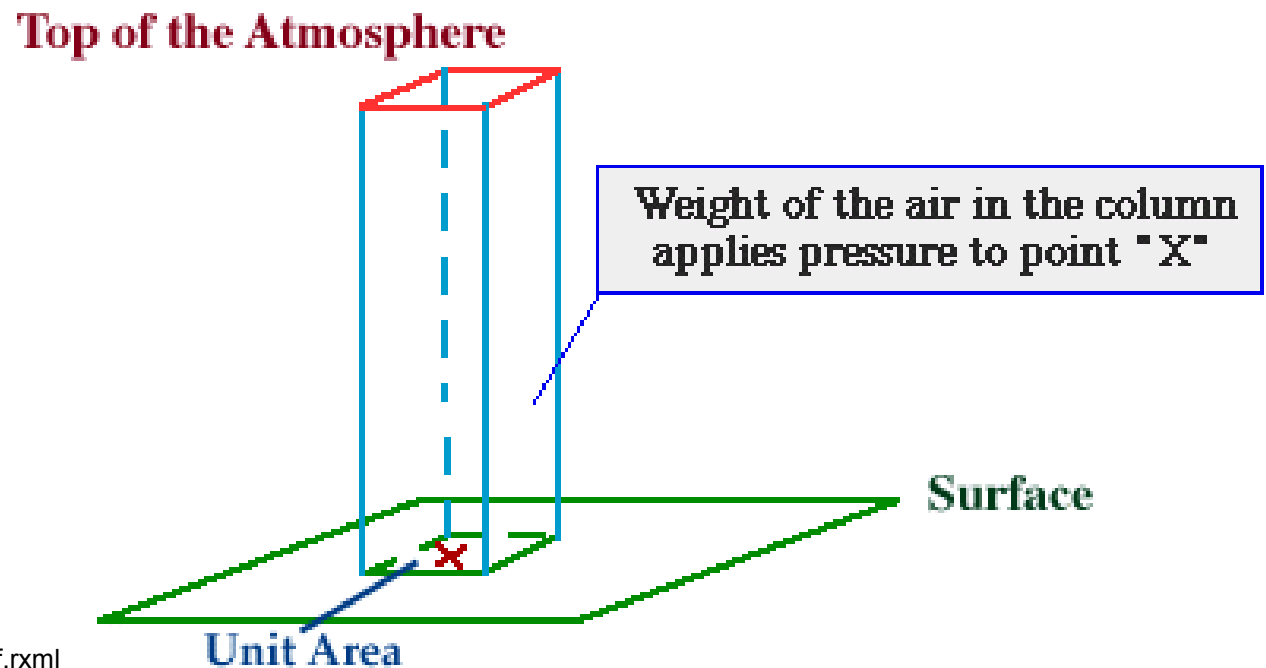


What is Air Pressure?

- The weight of the atmosphere as it pushes down upon Earth's surface and exerts a force per unit of area



Units of Pressure

Inches of Mercury → (" Hg)

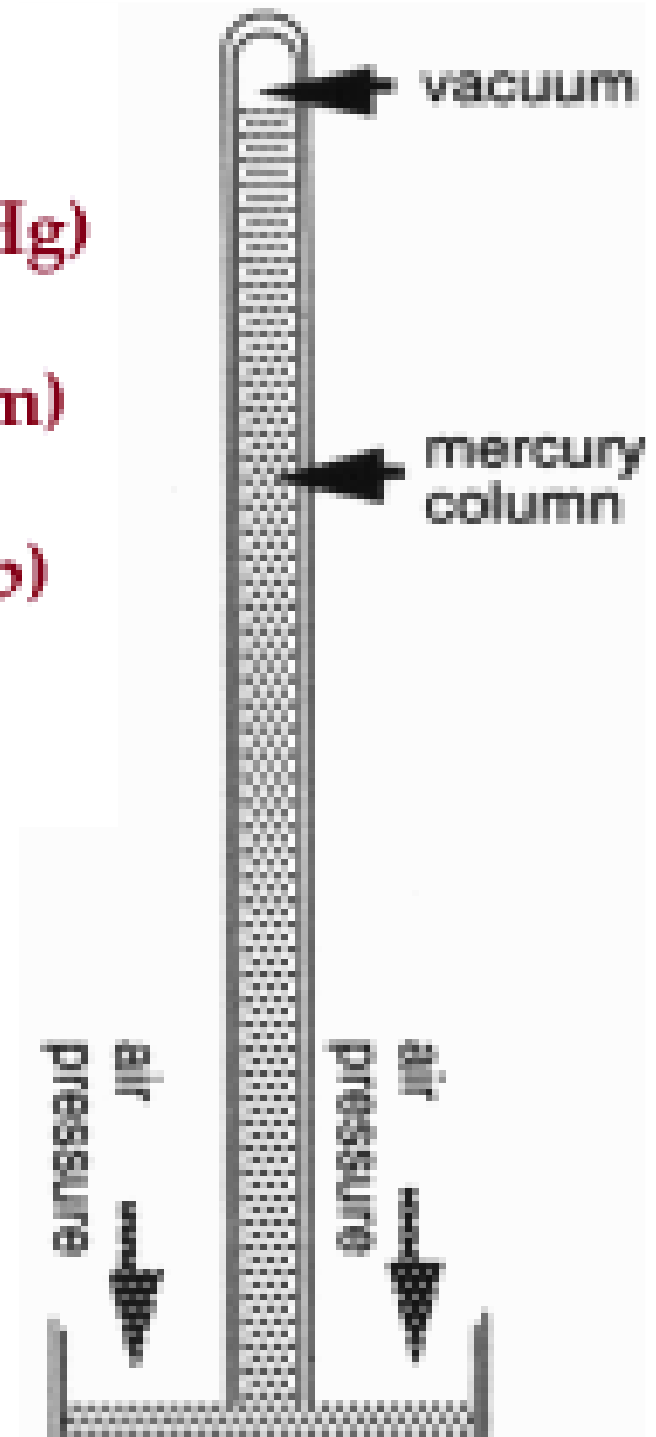
Atmospheres → (atm)

Millibars → (mb)

$$1013.25 \text{ mb} = 29.92 \text{ "Hg} = 1.0 \text{ atm}$$

On TV, inches of mercury is typically used.

Meteorologists typically use millibars



Why Does Air Pressure Change?

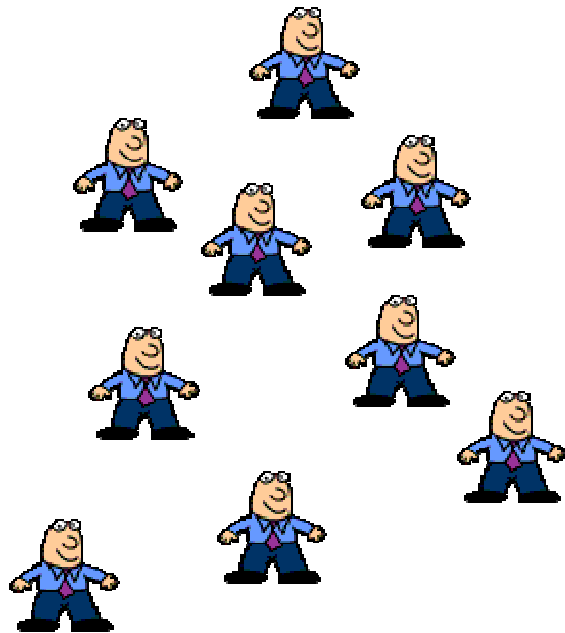
- Besides changes in elevation, both **temperature** and **humidity** affect air pressure.

TEMPERATURE:

- When air is warmed, its molecules move farther apart, and air pressure decreases.
 - Analogy: If you're jumping around, you move farther away from others...
- When air is cooled, its molecules move closer together, and air pressure increases.
 - If you're getting cold, you huddle closer together...



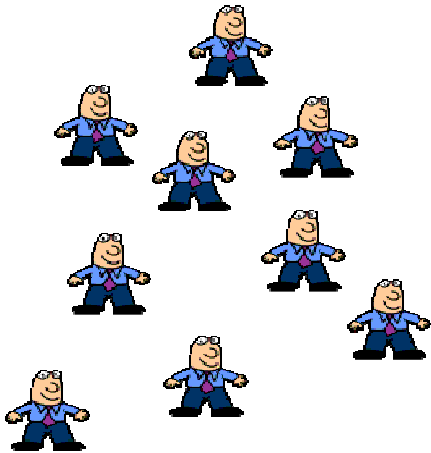
Which is warmer/colder air?
Which has the higher/lower air
pressure?



Why Does Air Pressure Change?

Temperature:

If warm air replaces cold air in a region, the air pressure in that region will decrease.



If cold air replaces warm air in a region, the air pressure in that region will increase.



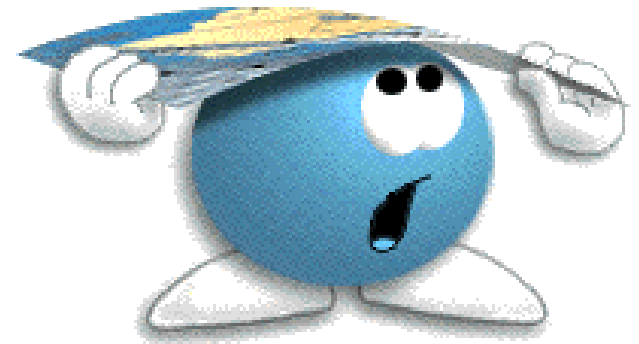
Why Does Air Pressure Change?

Humidity:

- As the percentage of water vapor increases, the percentage of oxygen and nitrogen decreases in the atmosphere.
- Therefore, **the more water vapor the air contains, the lighter the air is, because water molecules have less mass than oxygen or nitrogen molecules.**

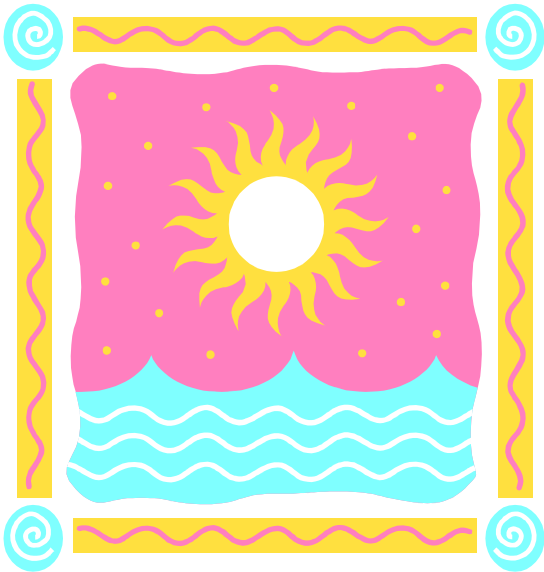
Air Pressure and Weather...

- A decrease in air pressure often signals the approach of warmer, more humid air, along with rain or snow.
 - Humid air = low air pressure
- An increase in air pressure often signals the arrival of cooler, drier air and fair weather.
 - Dry Air = high pressure

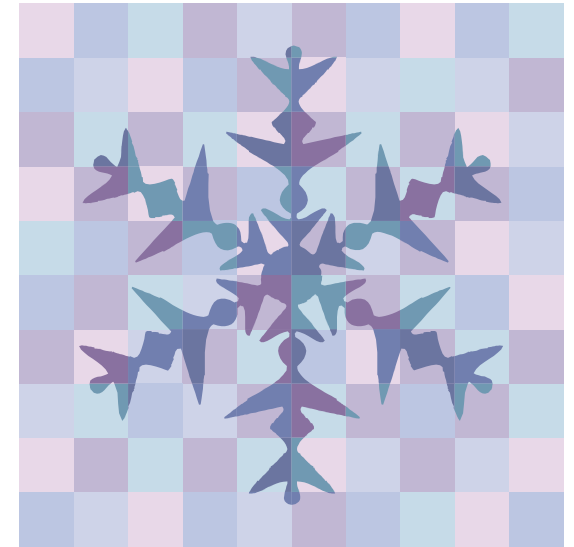


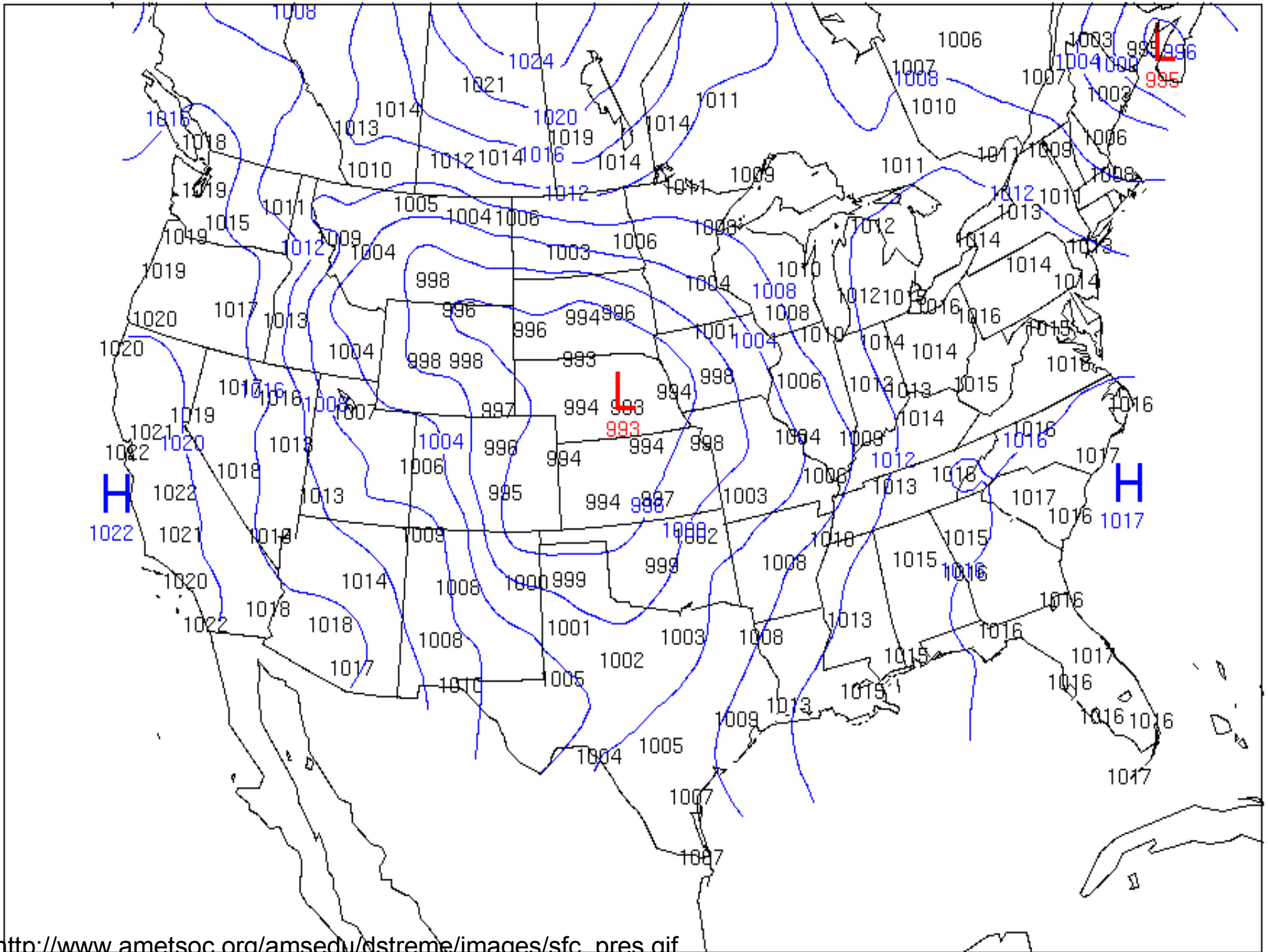
Low or High pressure??

High

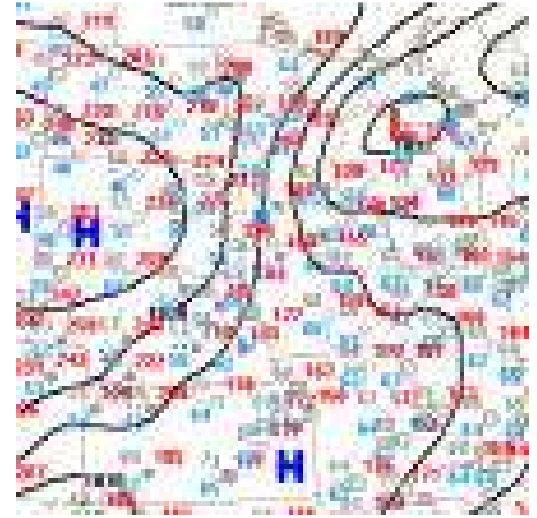


Low





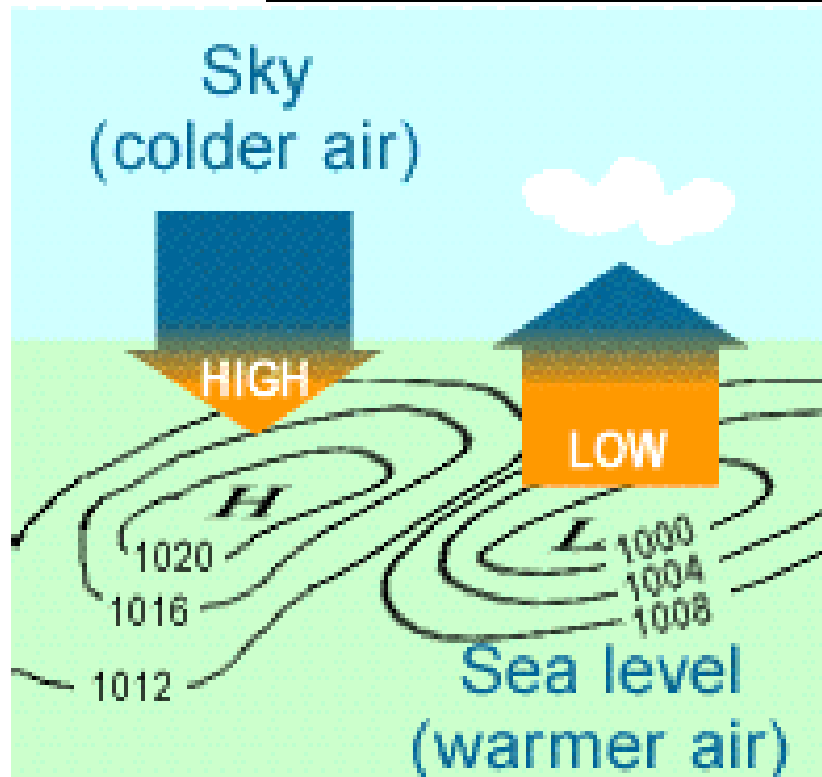
Why Does Air Pressure Change?



- Meteorologists analyze air pressures by plotting isobars on weather maps.
- **Isobars are lines that join points having the same air pressure.** A closed isobar is one that forms a closed loop on a weather map.
- **Closely spaced isobars** on a weather map indicate an area where **air pressure changes quickly**. Dividing this pressure change by the distance over which the pressure changes yields the **pressure gradient**.

Why Does Air Pressure Change?

- If the air pressure steadily increases toward the center of a set of closed isobars, the area defined by the isobars is called a **high-pressure area** or **high**.



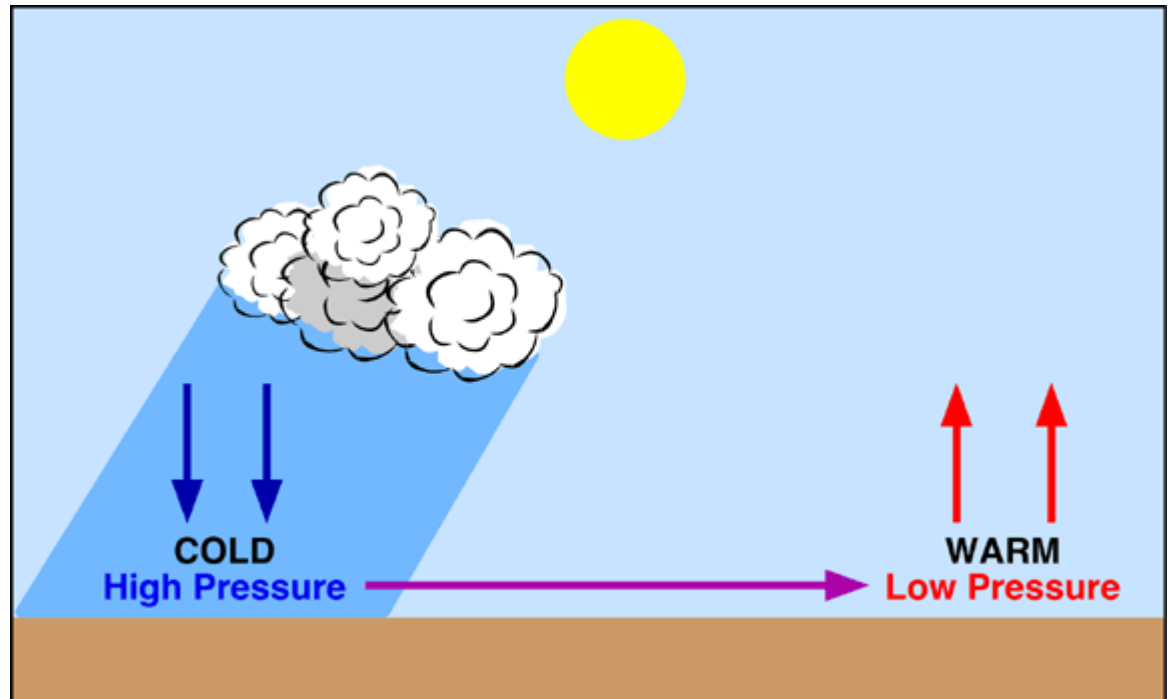
- If the air pressure steadily decreases toward the center of a set of closed isobars, the area defined by the isobars is called a **low-pressure area** or **low**.

What Makes the Wind Blow?

- Air flows from high-pressure areas to low-pressure areas.

http://www.classzone.com/books/earth_science/terc/content/visualizations/es1903/es1903page01.cfm?chapter_no=visualization

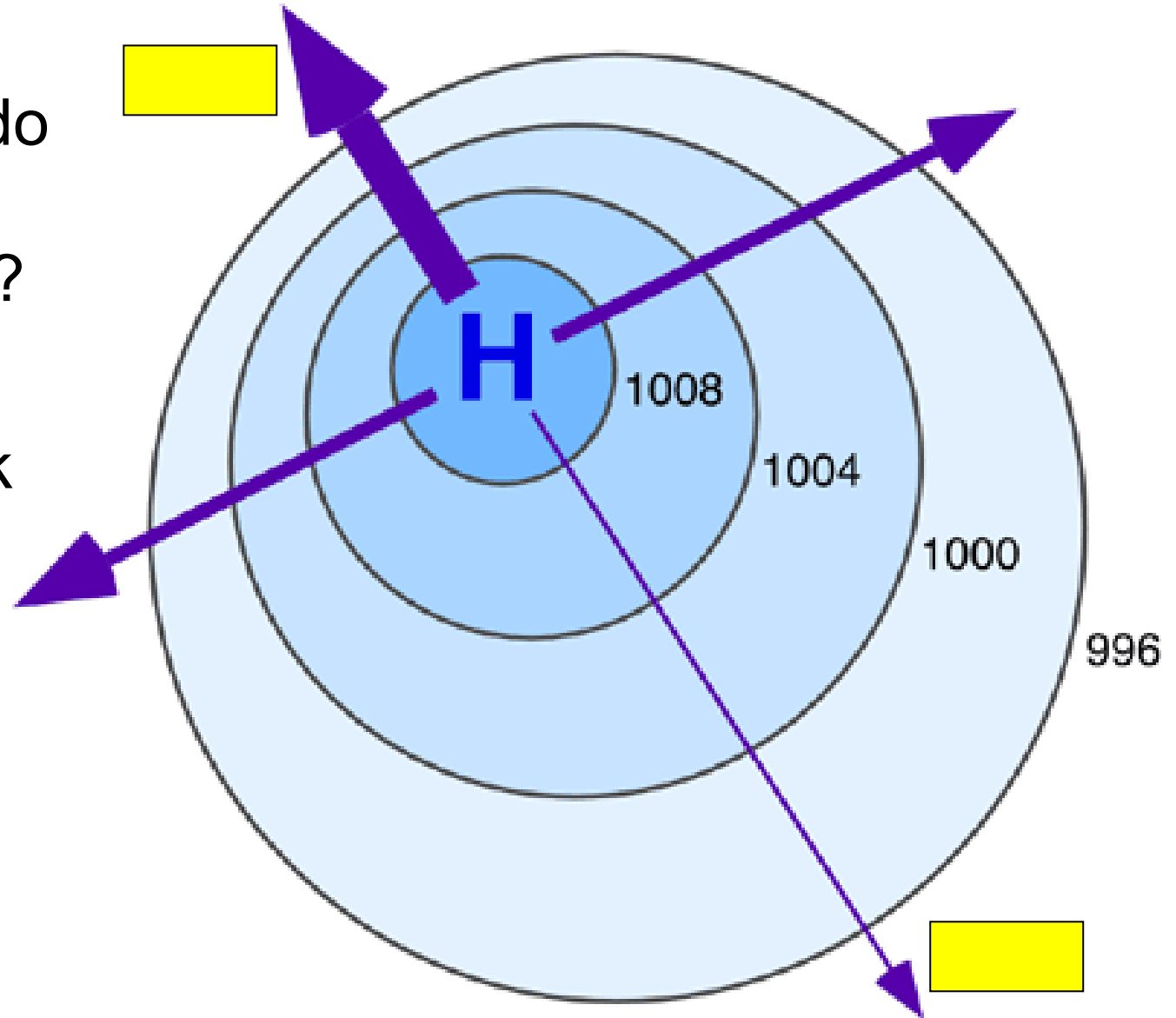
- The greater the difference in air pressure between two points, the stronger the wind that blows between them.



What Makes the Wind Blow?

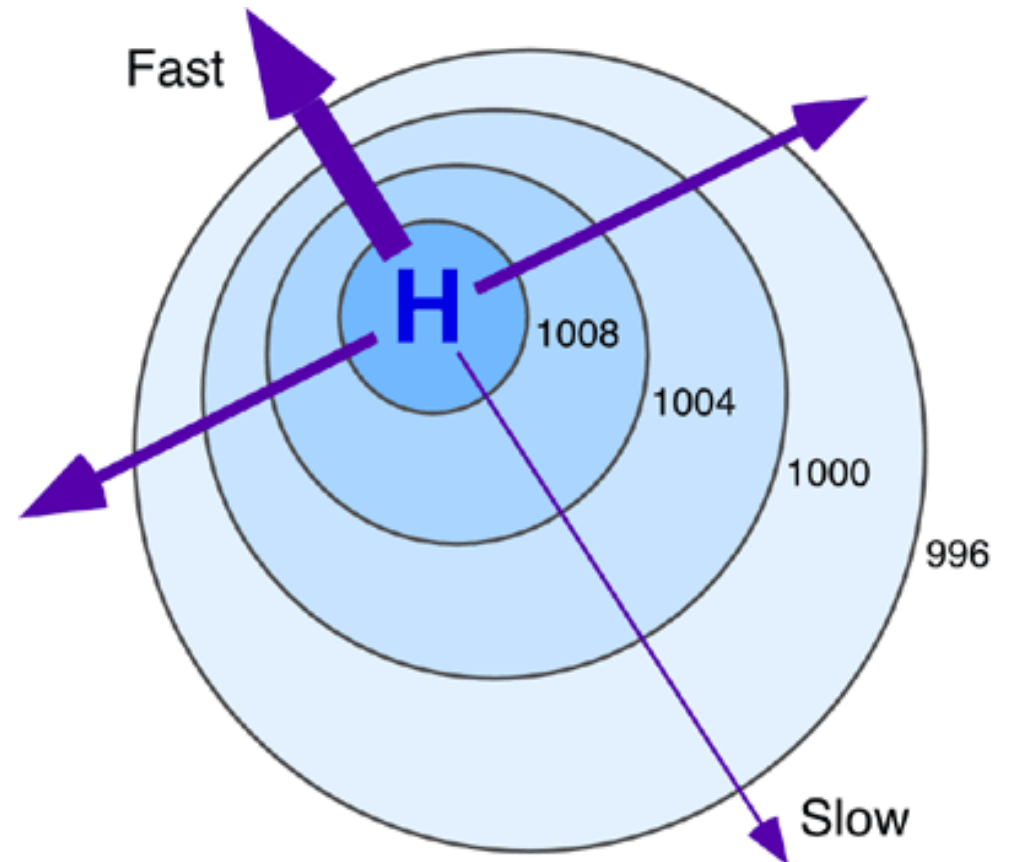
Which direction do you think has fastest winds??

Why do you think so??



What Makes the Wind Blow?

Closely spaced isobars indicate a strong pressure gradient and strong winds; widely spaced isobars indicate a weaker pressure gradient and weaker winds.



What Makes the Wind Blow?

- Pressure differences and winds are ultimately caused by the unequal heating of Earth's surface.
- Areas of higher pressure (cooler air) will move toward areas of lower pressure (rising, warmer air).

H → L

