The Elements of Climate: Wind and Pressure
Unit 3: Weather and Climate
Geography 12

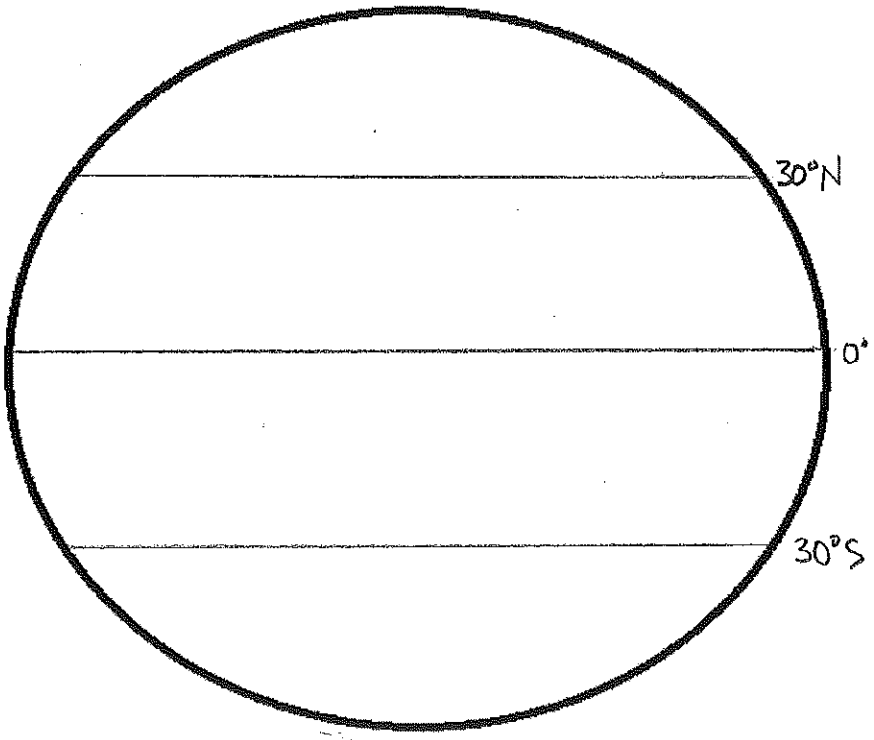
Name:
Period:

Part I: Winds

Winds are defined as a horizontal movement of air from one place to another above the earth's surface. We describe winds by the direction in which they come from.

Under the influence of the heat from the sun, the air above the equator would become extremely hot. Conversely, the air in polar regions would be very cold. This cold air, being heavy, would descend at the poles (forming high pressure), flow toward the equator, and force hot air there to rise. The equator would, therefore, become a low-pressure area. The air rising at the equator would then flow poleward at high altitudes to complete the circulation. It is important to note that winds do not flow in this simple pattern, the earth rotates and causes winds to be deflected.

Use the diagram on page 251 in Physical Geography to label the following winds: **polar easterlies, northeast trade winds, southeast trade winds, doldrums, and areas of permanent high pressure and low pressure cells**.



Polar easterlies: surface winds at higher altitudes from the polar regions, blowing from the east.

Westerlies: surface winds at higher altitudes from the polar regions, blowing from the west.

Northeast trade winds: surface winds from the NE in the Northern Hemisphere.

Southeast trade winds: surface winds from the SE in the Southern Hemisphere.

Doldrums: low pressure area around the equator where prevailing winds are calm.

Jet Stream: fast moving air currents that exist in both hemispheres. Jet streams can steer high and low pressure systems.

Principles of Land and Sea Breezes:

As land heats and cools more rapidly than water the temperature and pressure of air is influenced by it's location. Use figure 17.5 on page 253 in Physical Geography to illustrate and explain land and sea breezes.

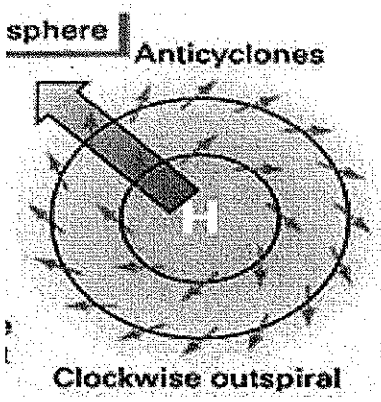
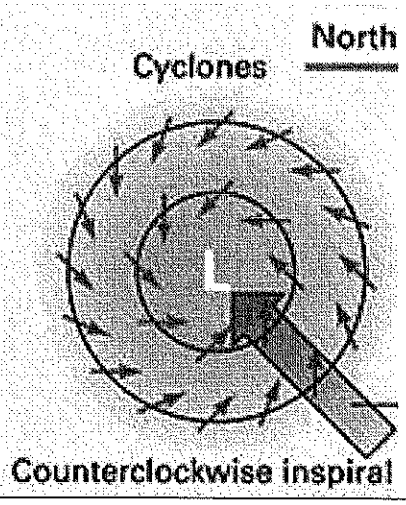
Part II: Pressure Systems

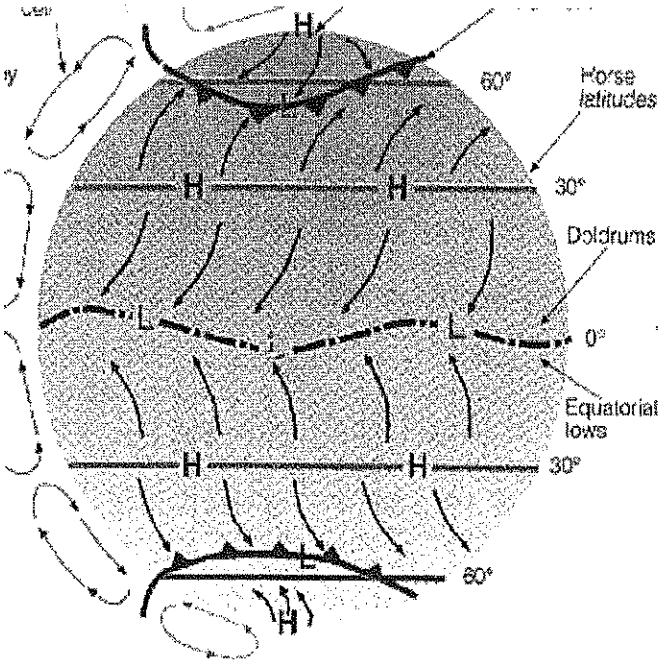
In certain parts of the earth, the air is sinking and in others the air is rising. Is areas, where air sinks faster than it can push the air below out and where air is drawn out faster than it can be replaced, we have low and high pressure systems.

High Pressure System: air that sinks faster than it can air out and builds up.

Low Pressure System: air drawn away faster than it can be replaced.

Let's look at the difference between high and low pressure:

High Pressure	Low Pressure
- cool, dry air - fair weather: clear, crisp, cool - rising air pressure indicates an **anticyclone:** clockwise circulation of air/wind → the center of air pressure.	- warm, moist air - windy, wet - falling air pressure indicates **cyclone:** counter clockwise circulation of air/wind from the center of low pressure.
	



Use the diagram to answer the following questions:

Where are permanent high-pressure regions?

_____

What can be found in areas of high pressure?

_____

Where are permanent low pressure regions?

_____

What can be found in areas of low pressure?

_____

Part III: Methods of Measuring and Recording Pressure

Air is a mass, and it therefore exerts pressure on the ground. The weight of the air is referred to as air pressure. Air pressure varies with elevation. As you go up the mountain, there is less air above you, so the air pressure is lower. Air pressure is also affected by the heating and cooling of the earth's surface. Hot air rises, so the air pressure at higher elevations is less than that of the cool air at lower elevations, which is usually heavier.

Air pressure is measured in **milibars (mb)** or **kilopascals (kPa)**: 10 mb = 1 kPa (move decimal over one when converting mb → kPa

Eg: average sea-level pressure is 1013.2 mb = _____

Places across the country with the same air pressure are joined together by lines called ***isobars***. Low pressure cells and high pressure cells are identified on the maps, which are used to make weather forecasts.

Examine the map on page 224 in Earth Matters and answer the following questions:

The isobar map shows pressure cells around the world in July

1. What countries are in areas of low pressure?

b) What type of weather would be associated with these regions?

2. What countries are in areas of high pressure?

b) What type of weather would be associated with these regions?

3. Identify the approximate air pressure for Vancouver in mb and in kPa: