

Chapter 9

Climate

Water Cycle (Hydrologic Cycle)

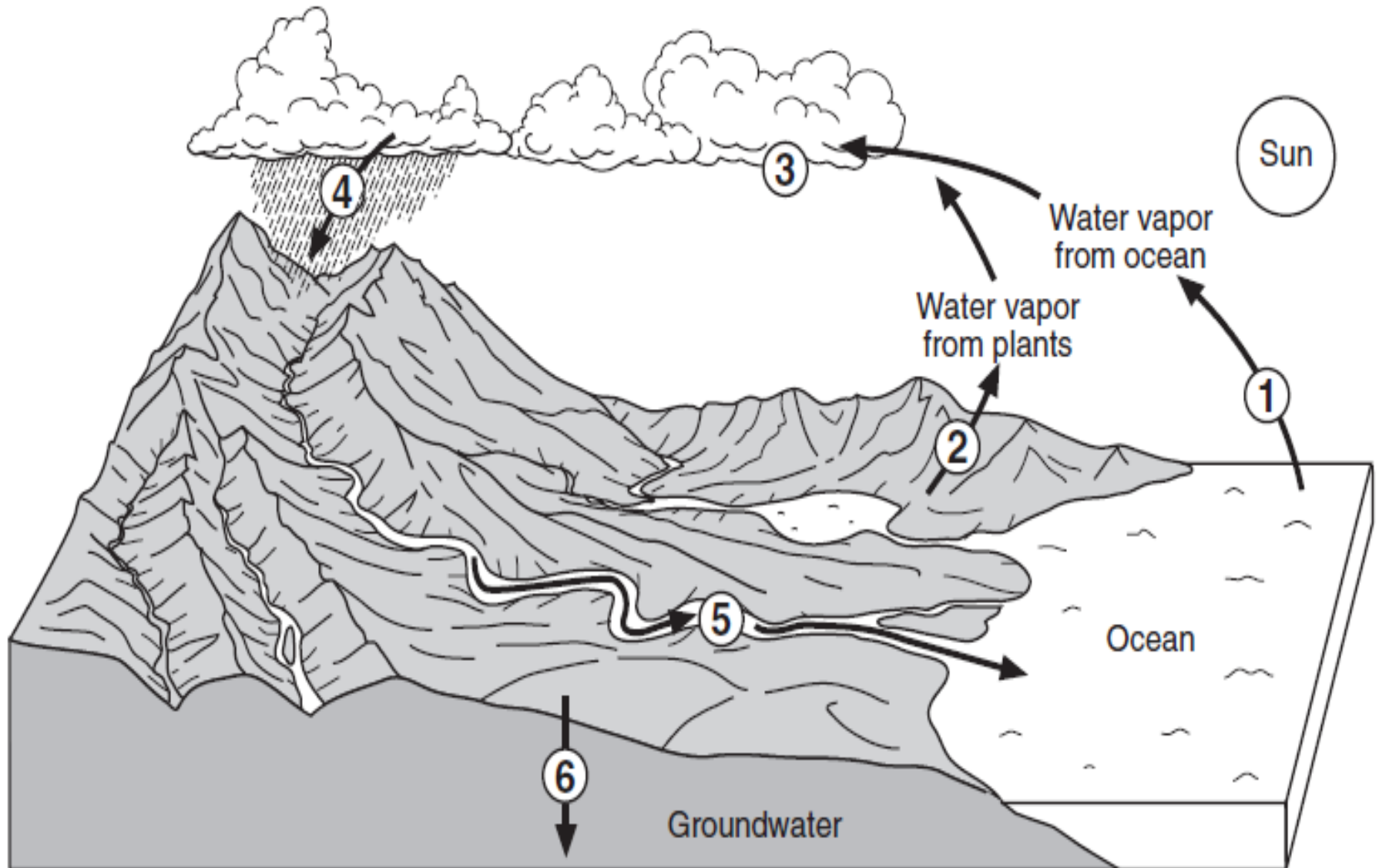
1. 98% of Earth's water is found in oceans
2. 2% in glaciers, rivers, lakes, clouds, and ground.
3. Runoff - excess water that can not infiltrate the ground.
4. Water collects in rivers and streams

* Rain and then what?

Things that happen to precipitation:

- 1. Water retention** – stored on land as ice or snow, held on leaves
- 2. Infiltration (seep)** – water sinks into the ground
- 3. Runoff** – flow over surface
- 4. Evapotranspiration** – evaporation and transpiration (into atmosphere)

Correctly label each process in your notes.



Factors Affecting Infiltration

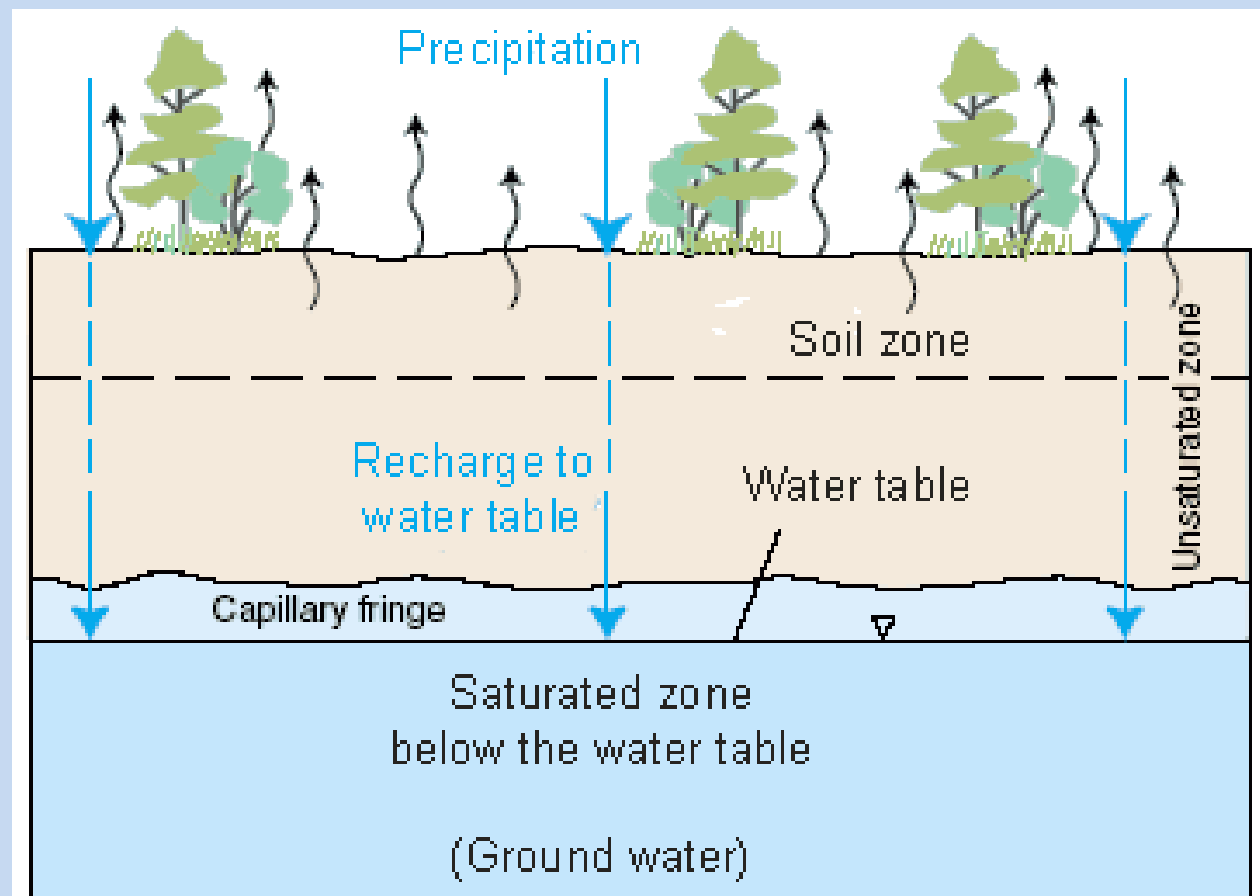
1. **SLOPE**: The steeper the slope, the more runoff and less infiltration.
2. **TEMPERATURE**: The colder the soil, the more runoff and less infiltration.
3. **PAVING**: The more paved the surfaces, the more runoff and less infiltration.
4. **VEGETATION**: The more vegetation, the more infiltration and less runoff.
5. **SATURATION**: The more saturated the ground, the more runoff and less infiltration.

Groundwater Zones

1. **Zone of Aeration** - pores in rock filled with air
2. **Zone of Saturation** - pores in rock filled with water
3. **Water Table** - is the boundary between the two zones
4. **Capillary Fringe** - area where water gets pulled up from the water table

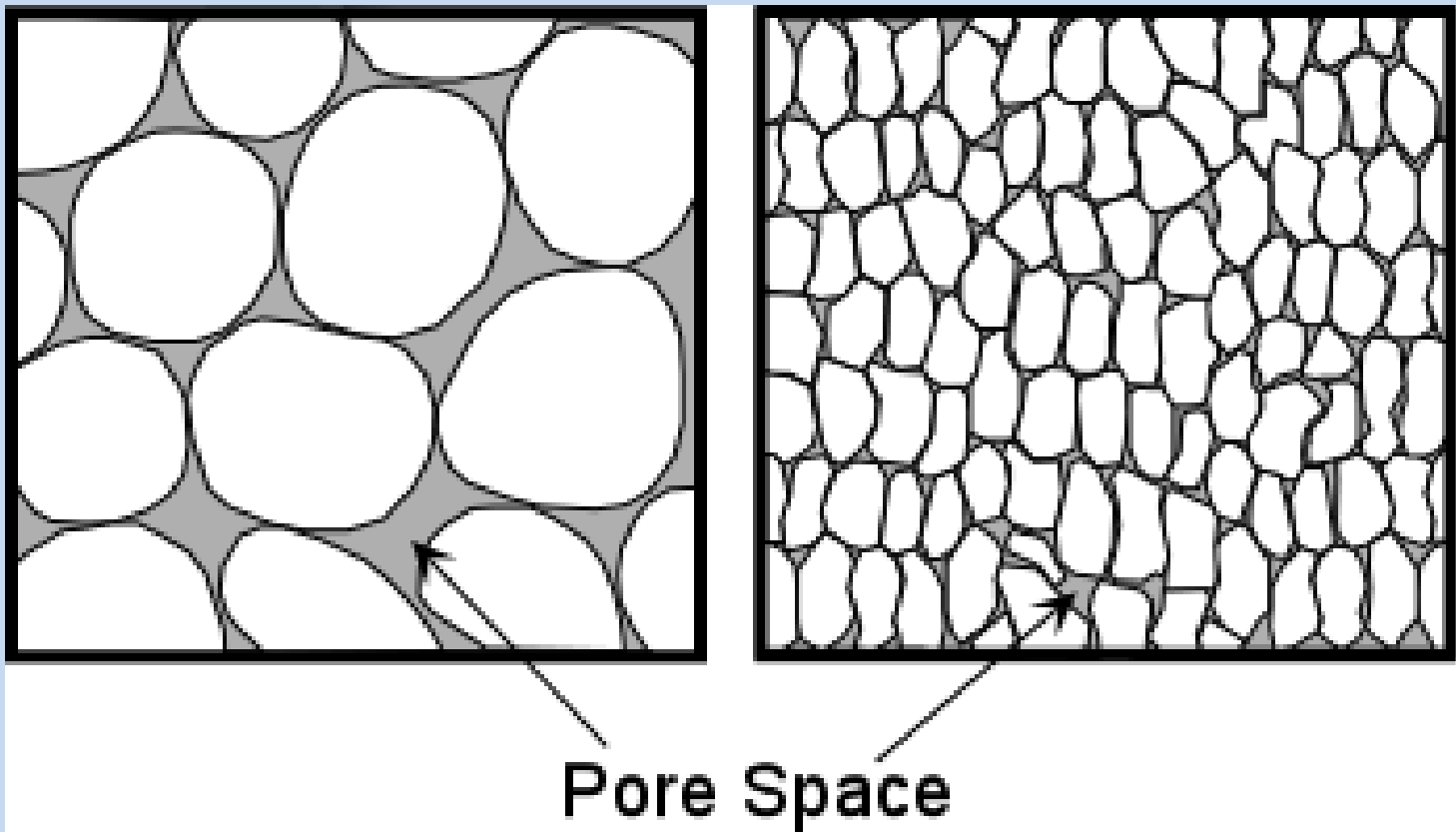
Infiltration

Downward movement of water through the soil.



Porosity

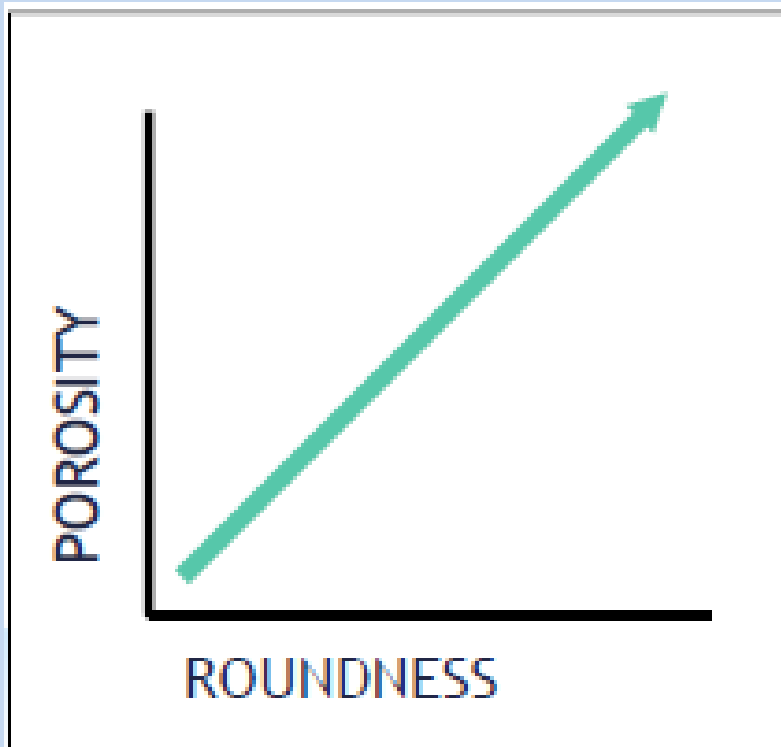
The percent of open space in a given volume of rock or soil.



Factors that Affect Porosity

Shape:

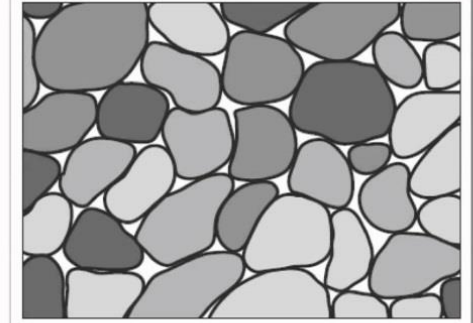
Round particles have a greater porosity.



Angled

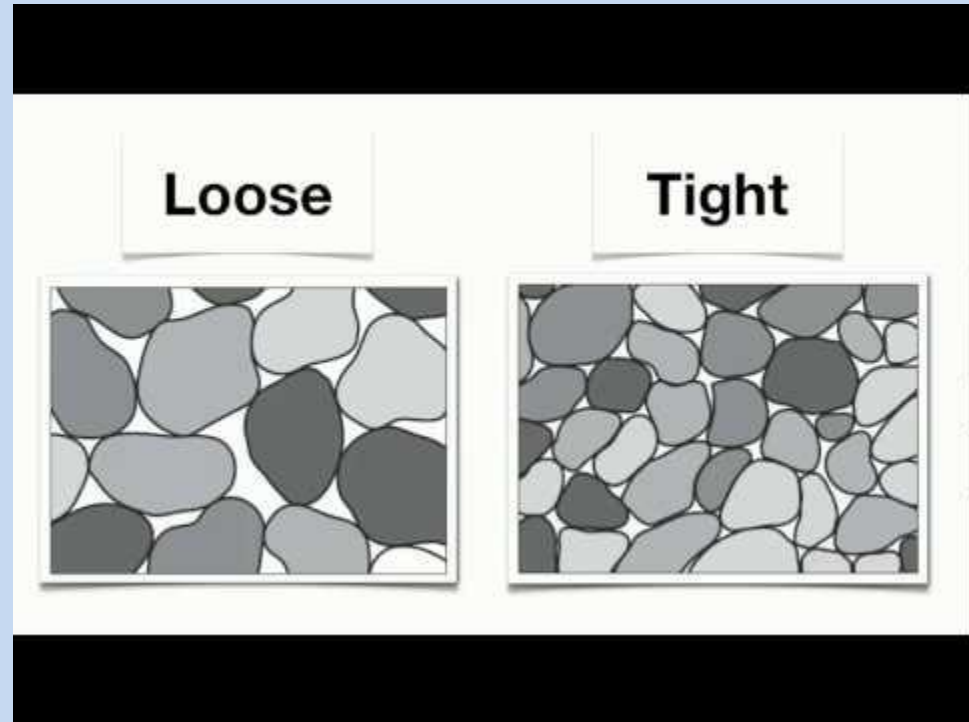


Rounded



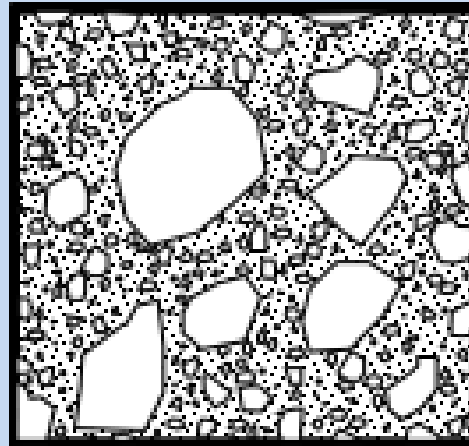
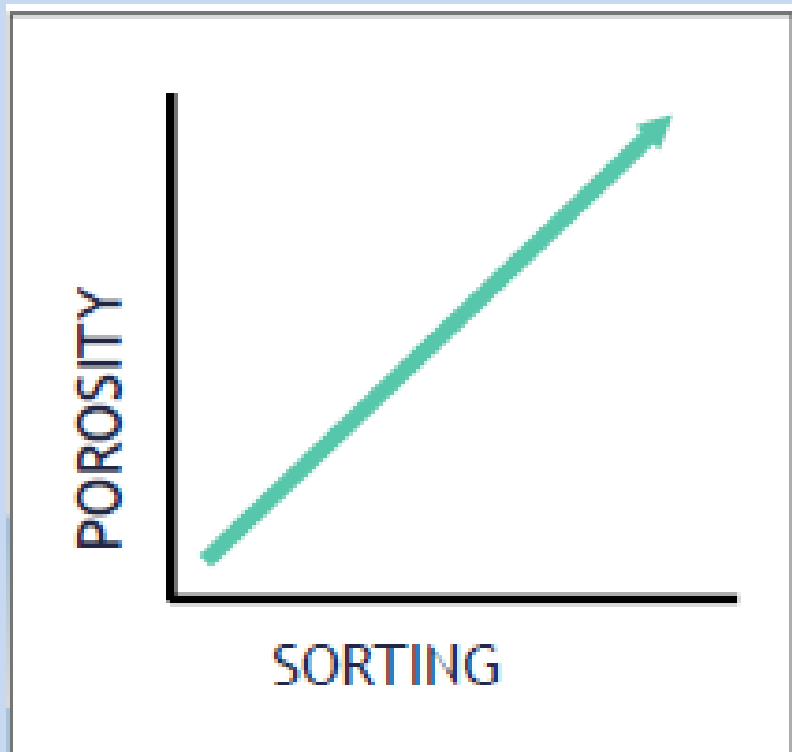
Packing:

Loose particles have greater porosity.

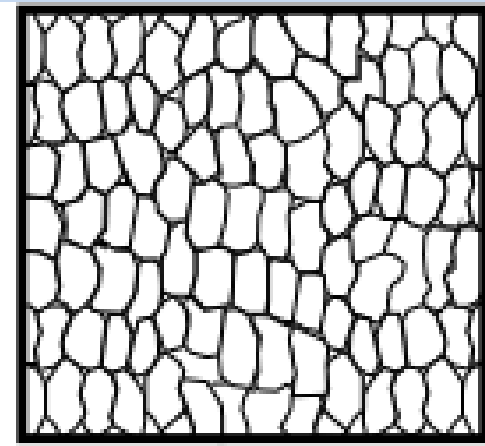


Sorting:

Sorted particles have greater porosity.

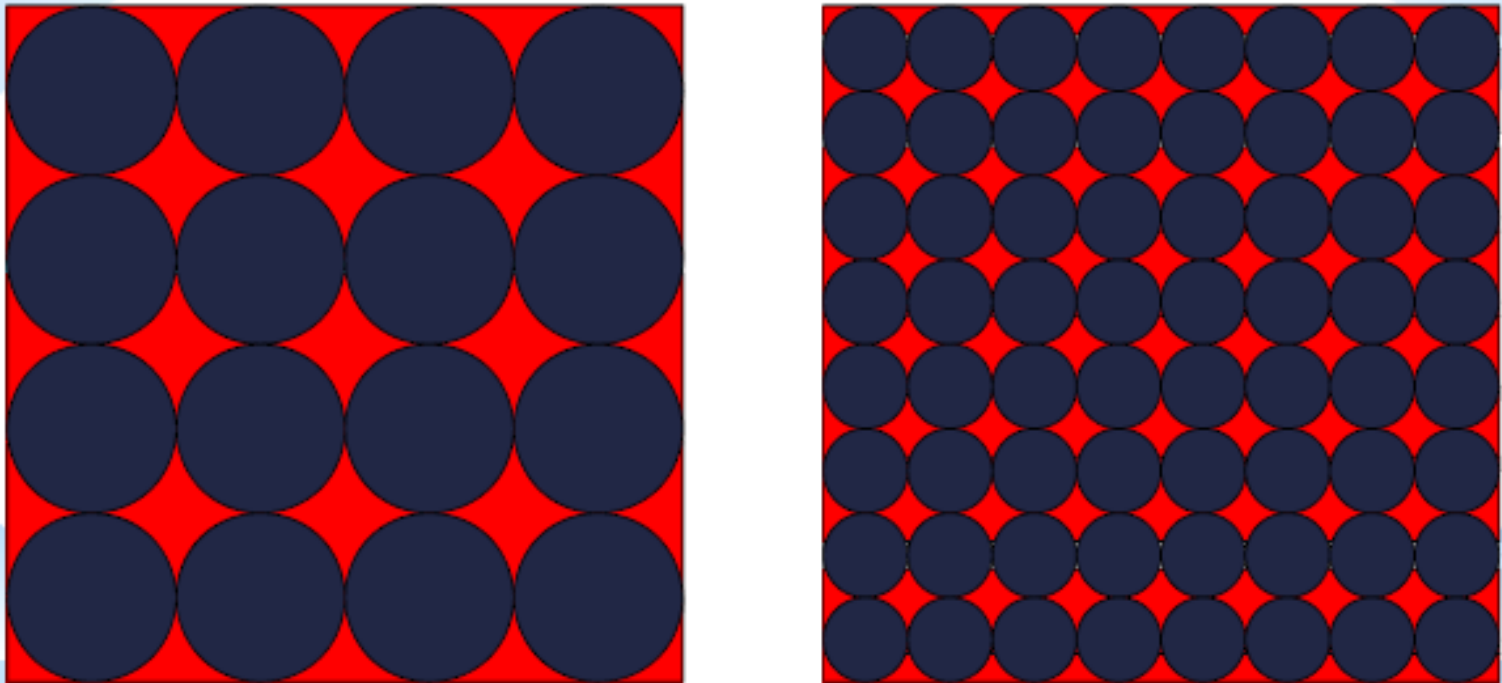


Poorly Sorted Sediment

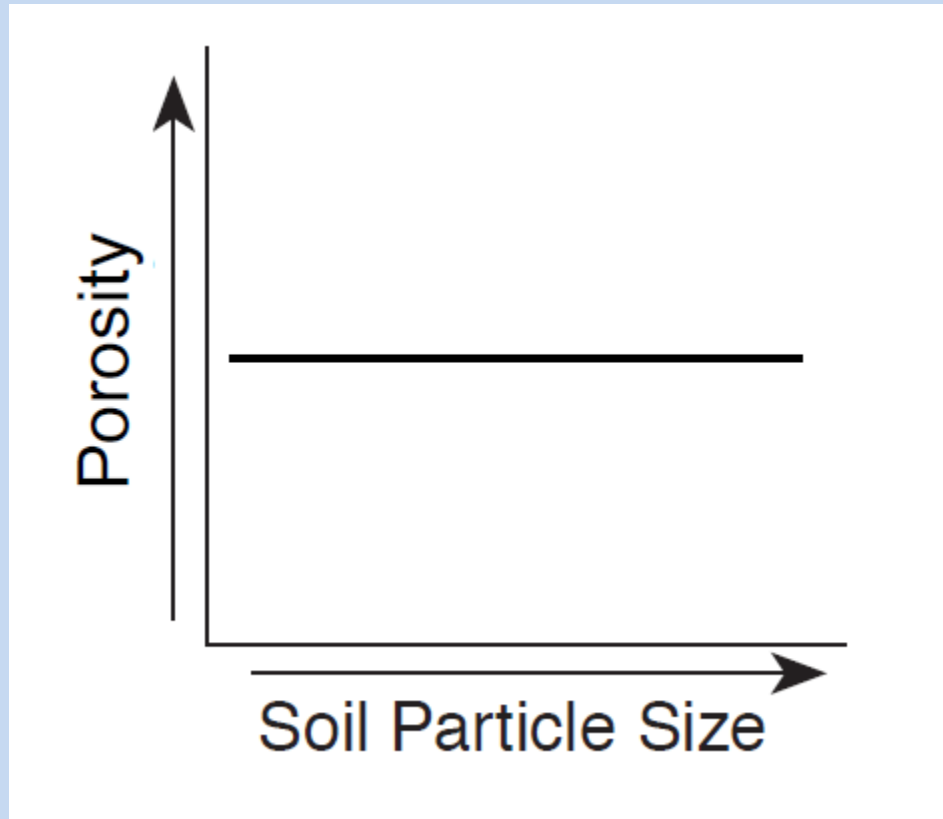


Well Sorted Sediment

**Size –porosity DOES NOT
depend upon particle size.**

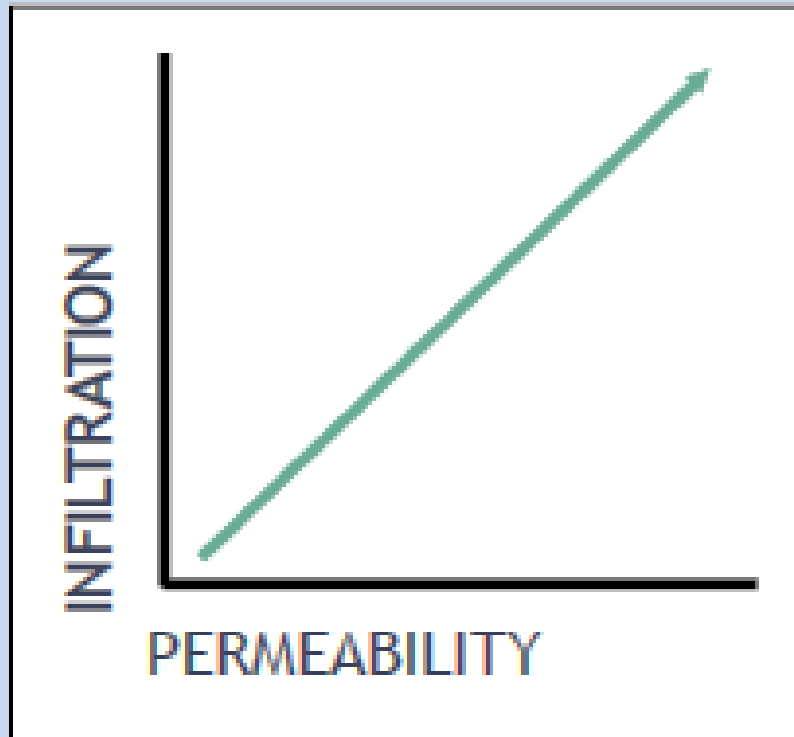


Particle size does not affect porosity.



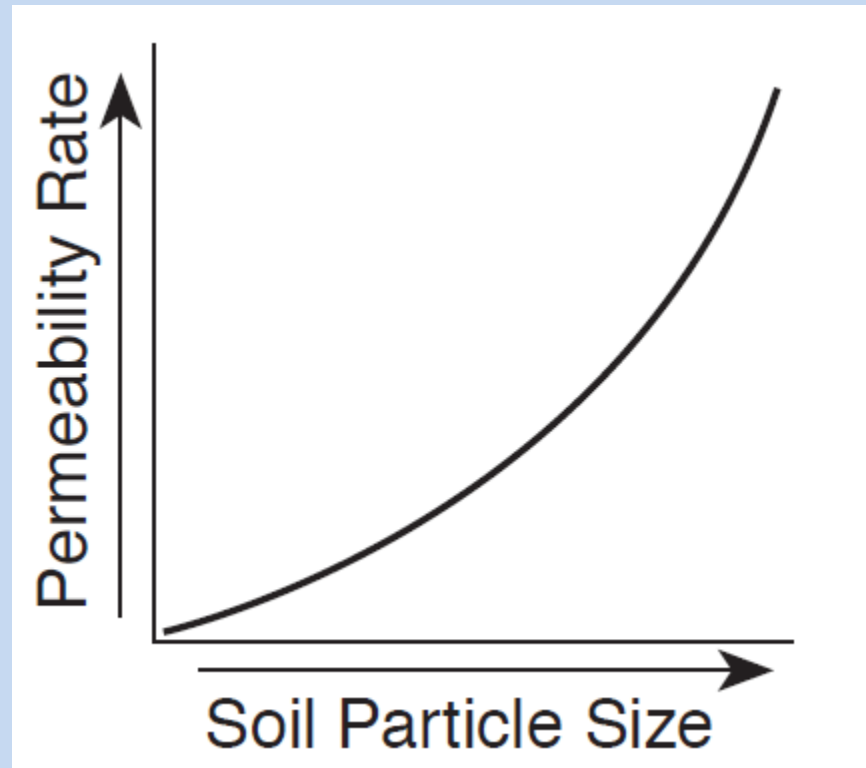
Permeability

How quickly water passes through a sample or soil or rock.

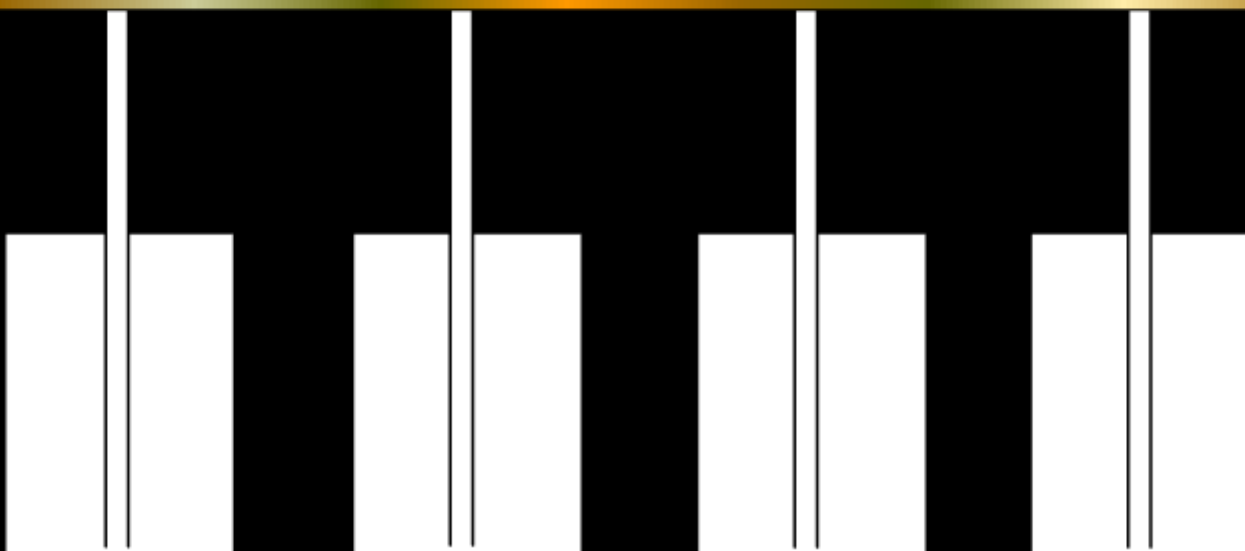
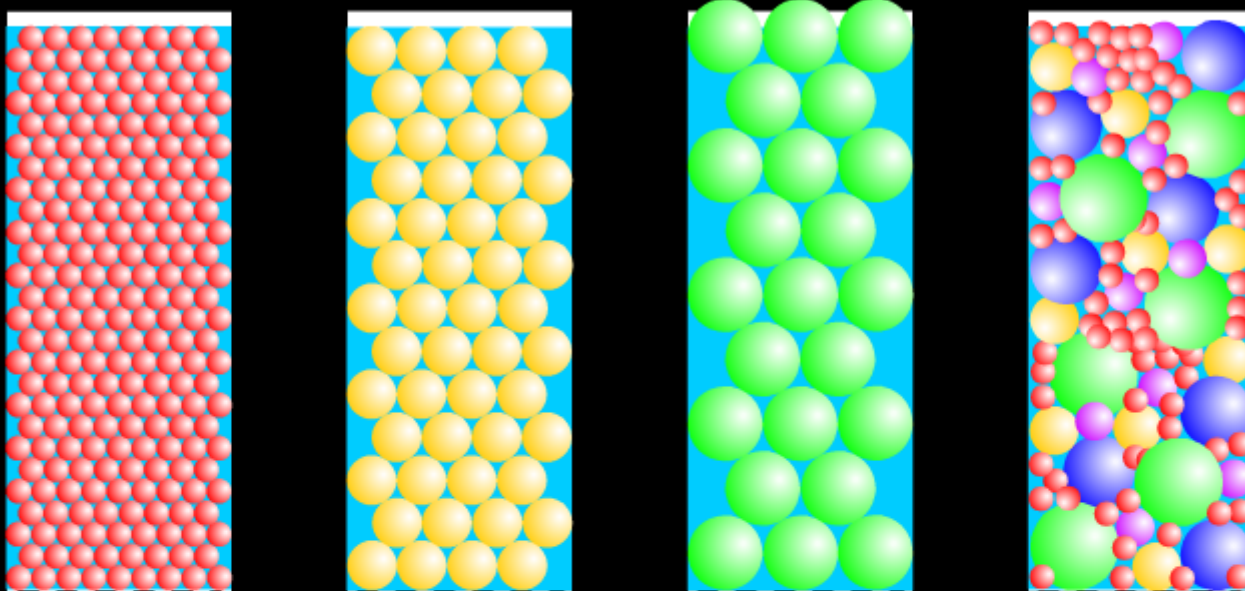


Permeability

The bigger the particles, the higher the permeability.



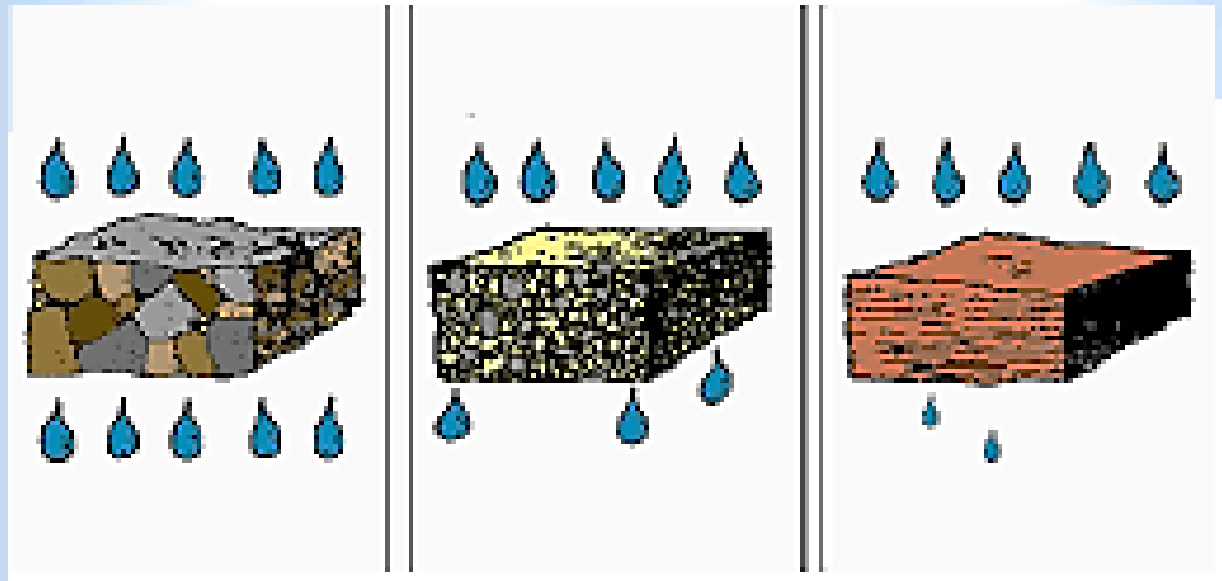
PERMEABILITY AND POROSITY



Impermeable: water cannot pass through.

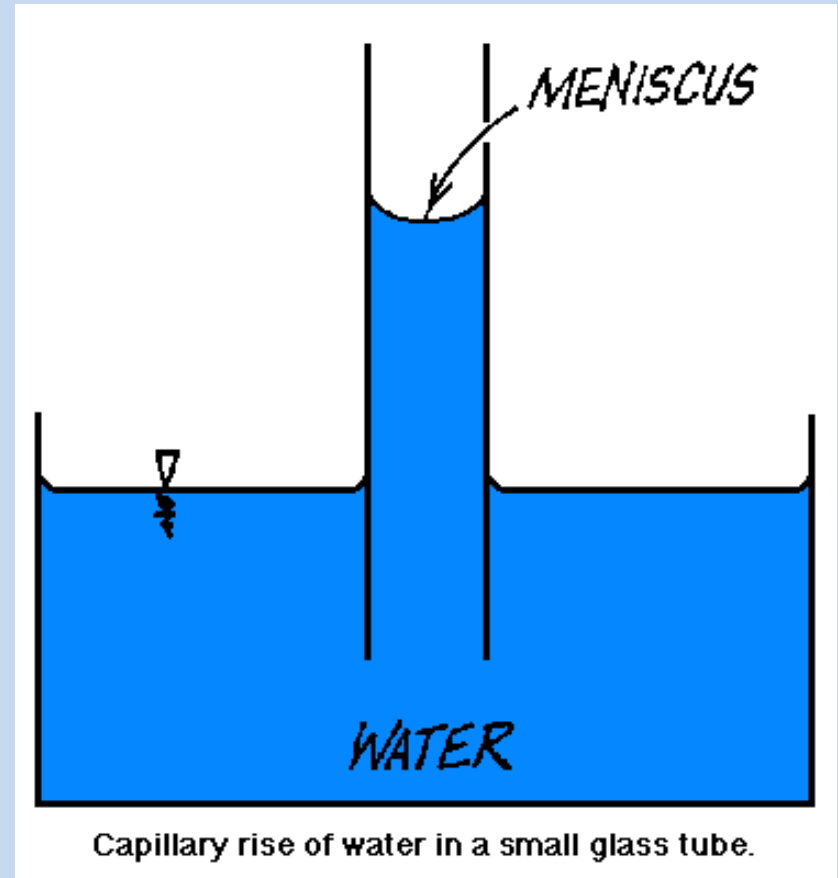
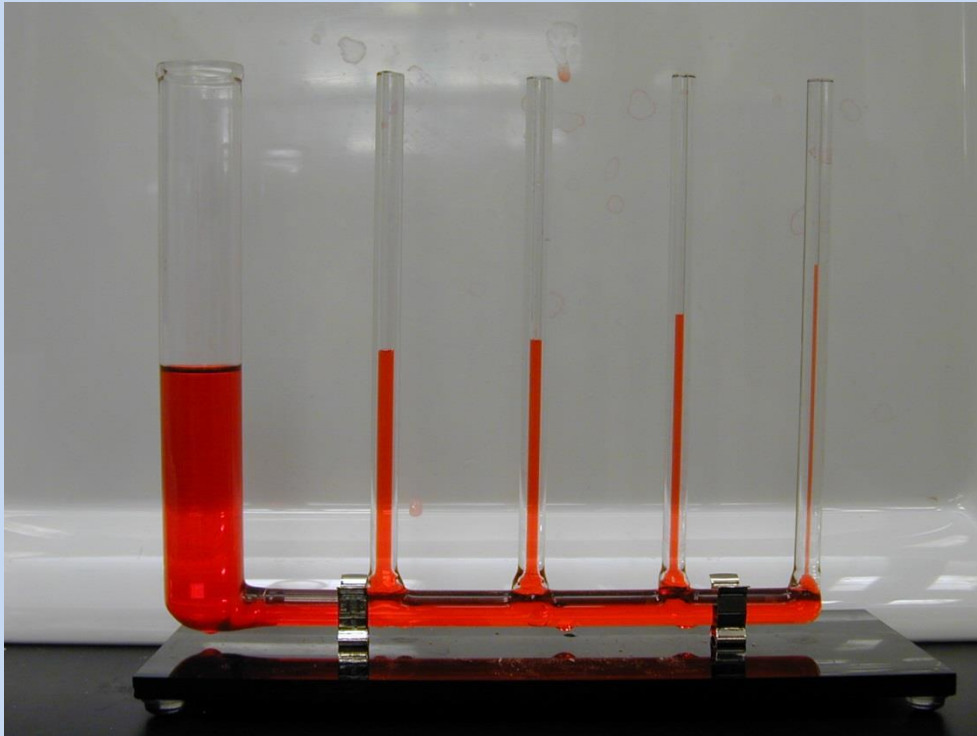
Impermeability (not permeable) is due to:

1. Tightly packing of particles.
2. Cementing of particles by clay.
3. Cementing of particles by ice (ground is frozen).

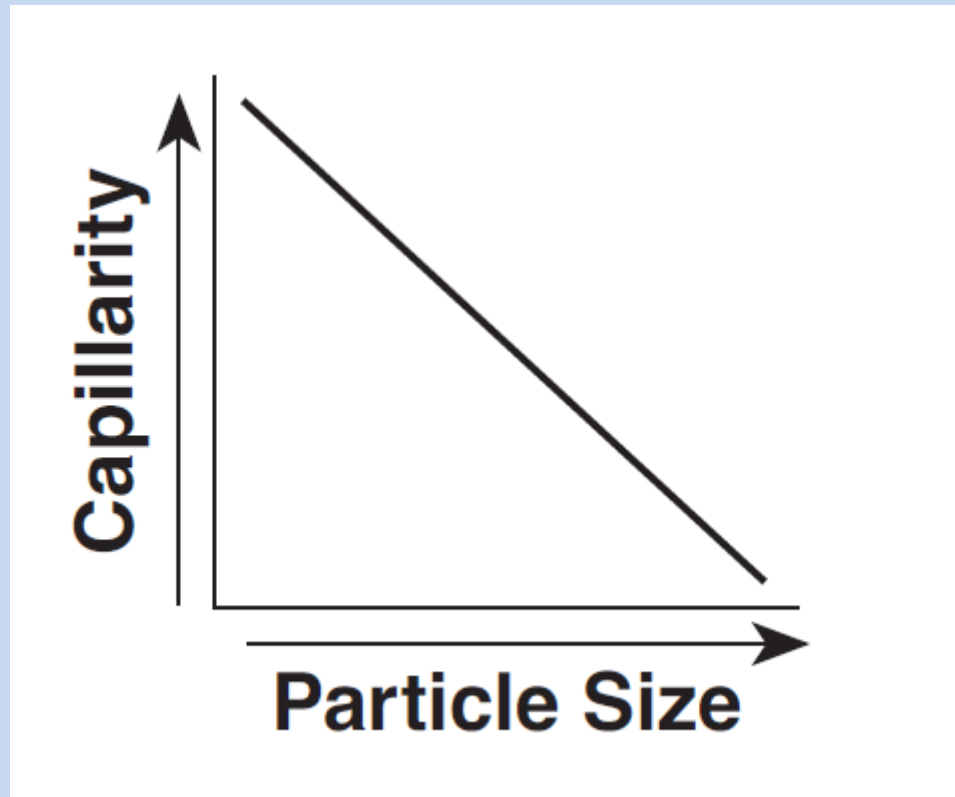


Capillarity

The upward movement of water from the water table toward plant roots.



Capillarity increases as sediment size **DECREASES**.



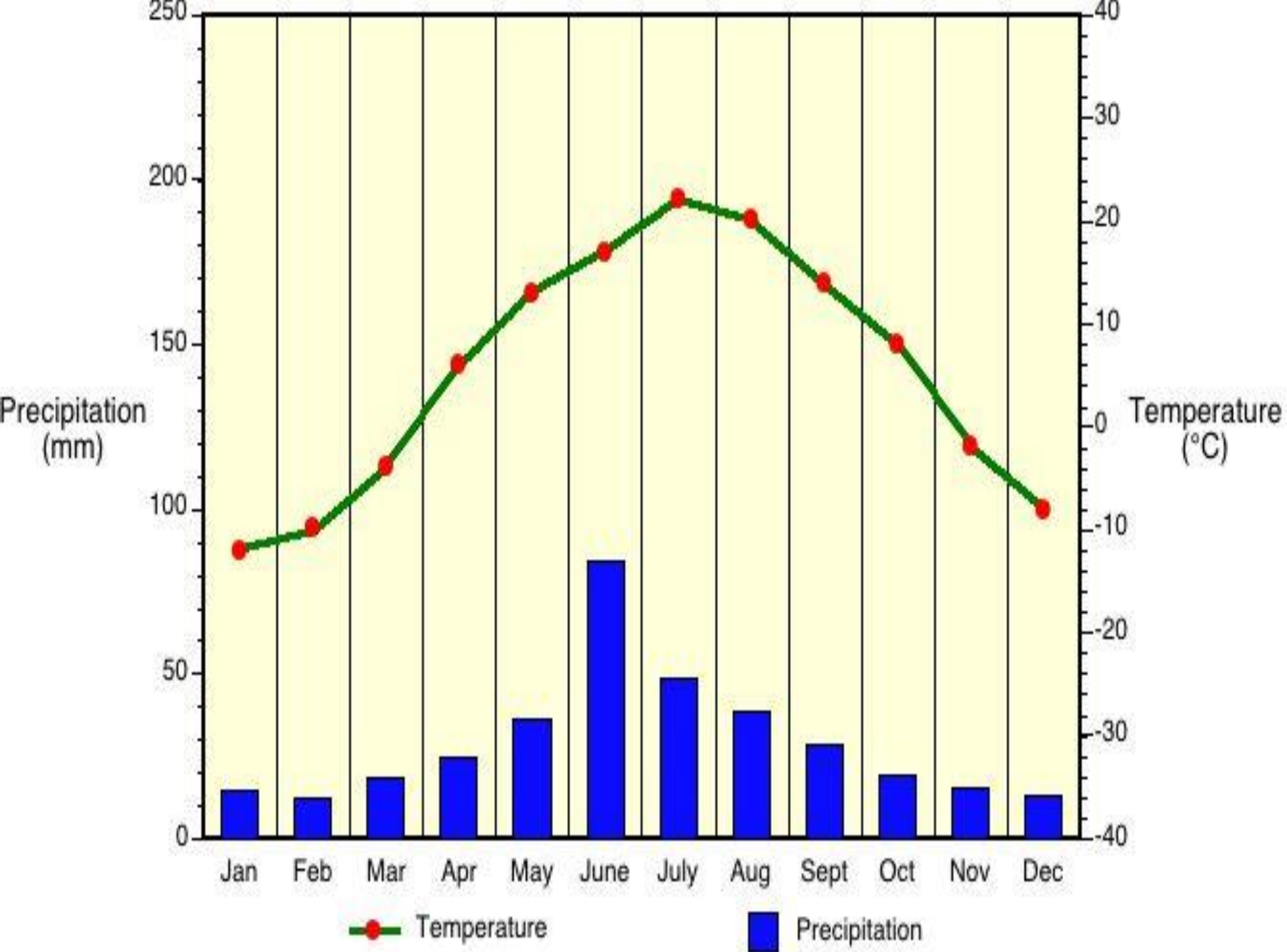
Climate

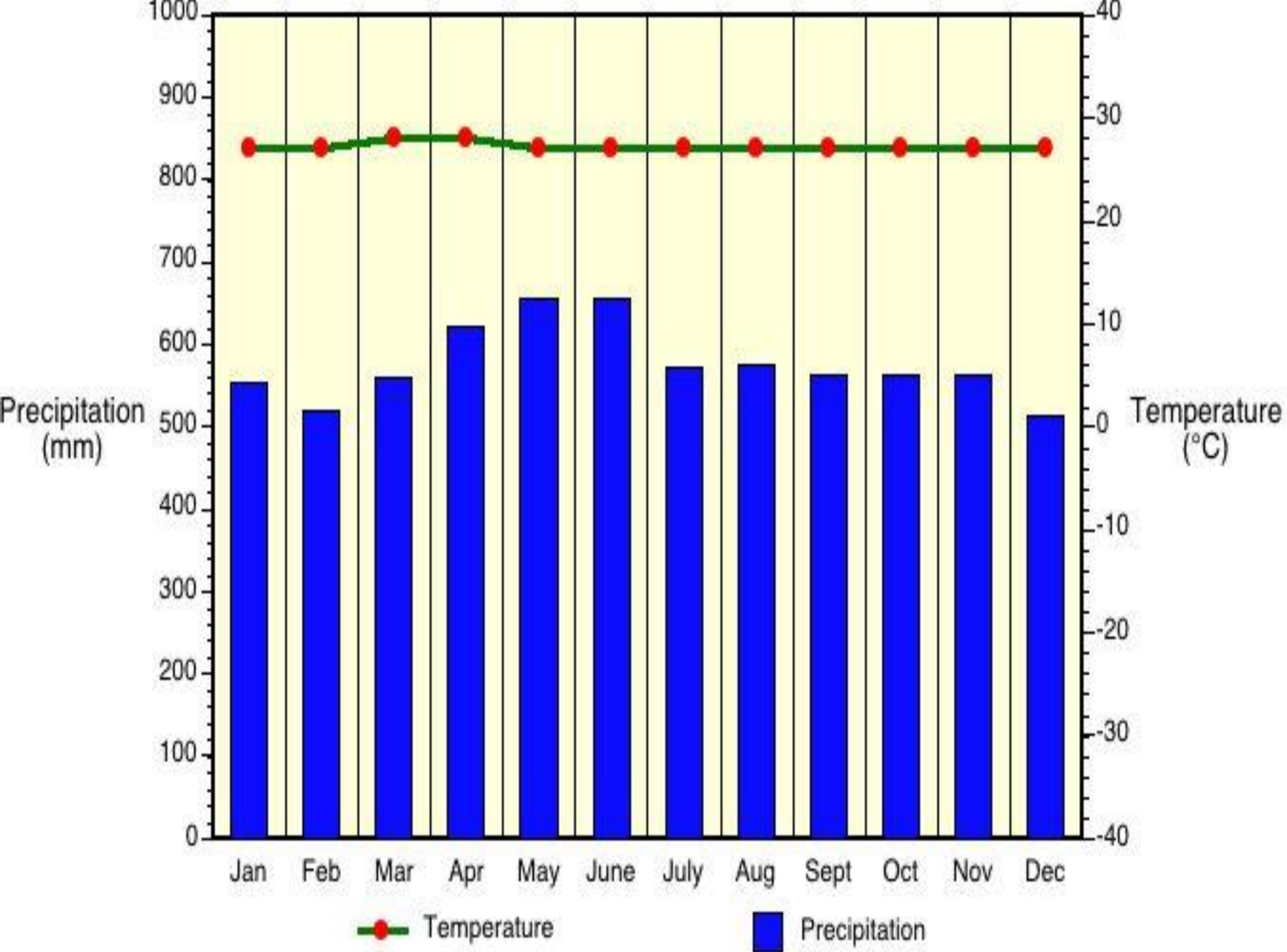
Climate – weather conditions of a large area, for a long period of time

- 1. Measured by temperature and humidity**
- 2. Annually –average of year, highs and lows, monthly average**
- 3. P = Average Annual Precipitation**
- 4. E_p = Average Annual Temperatue**
- 5. P / E_p Ratio = climate Type**

1. Latitude

- a. Latitude determines Angle of Insolation
- b. The higher the latitude, the lower the Angle of Insolation
- c. Higher Latitudes = Colder Temperatures
- d. Lower Latitudes = Warmer Temperatures





2. Altitude / Elevation

- a. An increase in altitude,
decrease in temperature.
- b. Higher altitudes tend to
have more moisture.

3. Mountain Ranges

- a. Adiabatic Lifting = cooling**
- b. Air rises on the windward side**
- c. Air sinks on the Leeward side**

3. Mountain Ranges

- d. Windward side of the mountain – cool and moist
- e. Leeward side of the mountain – hot and dry

**WINDWARD SIDE
COOL, MOIST CLIMATE**

**LEEWARD SIDE
HOT AND DRY**

Condensation, clouds,
precipitation

Expands & cools

Air rises

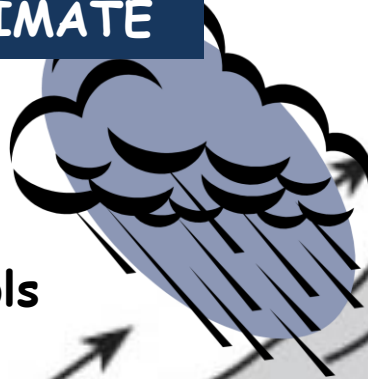
Wind

Ocean

Mountain

Air sinks

**Compresses &
warms
& evaporates
moisture from
the surface**





Mountain in the Kurile Islands, Russia, causes orographic cloud effect

Collection of Dr. Igor Smolyar

NOAA Central Library



4. Oceans or Large Bodies of Water

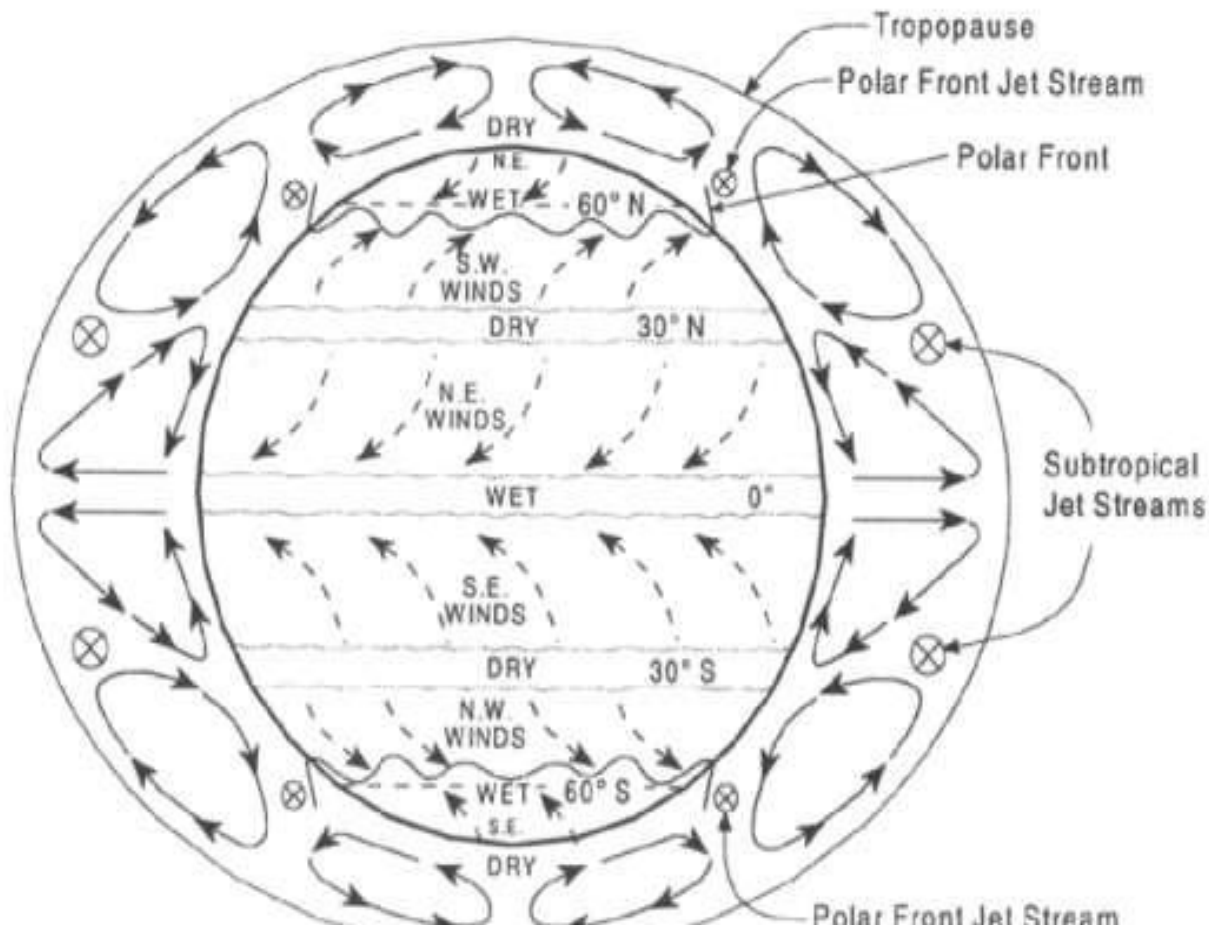
- a. Humid, marine climate (temperature will be moderated)
- b. Less of a temperature range
- c. Cooler summers, warmer winters

5. Middle of the Continent- (Landlocked)

- a. Will be continental climate
(extreme temperatures)
- b. Land Heats up and cools off fast
- c. Greater temperature range
- d. Hotter summers, colder winters

6. Planetary Wind Belts-

- a. Drive weather systems
- b. Storm tracks follow planetary wind belts



Planetary Wind and Moisture Belts in the Troposphere

The drawing to the left shows the locations of the belts near the time of an equinox. The locations shift somewhat with the changing latitude of the Sun's vertical ray. In the Northern Hemisphere, the belts shift northward in summer and southward in winter.

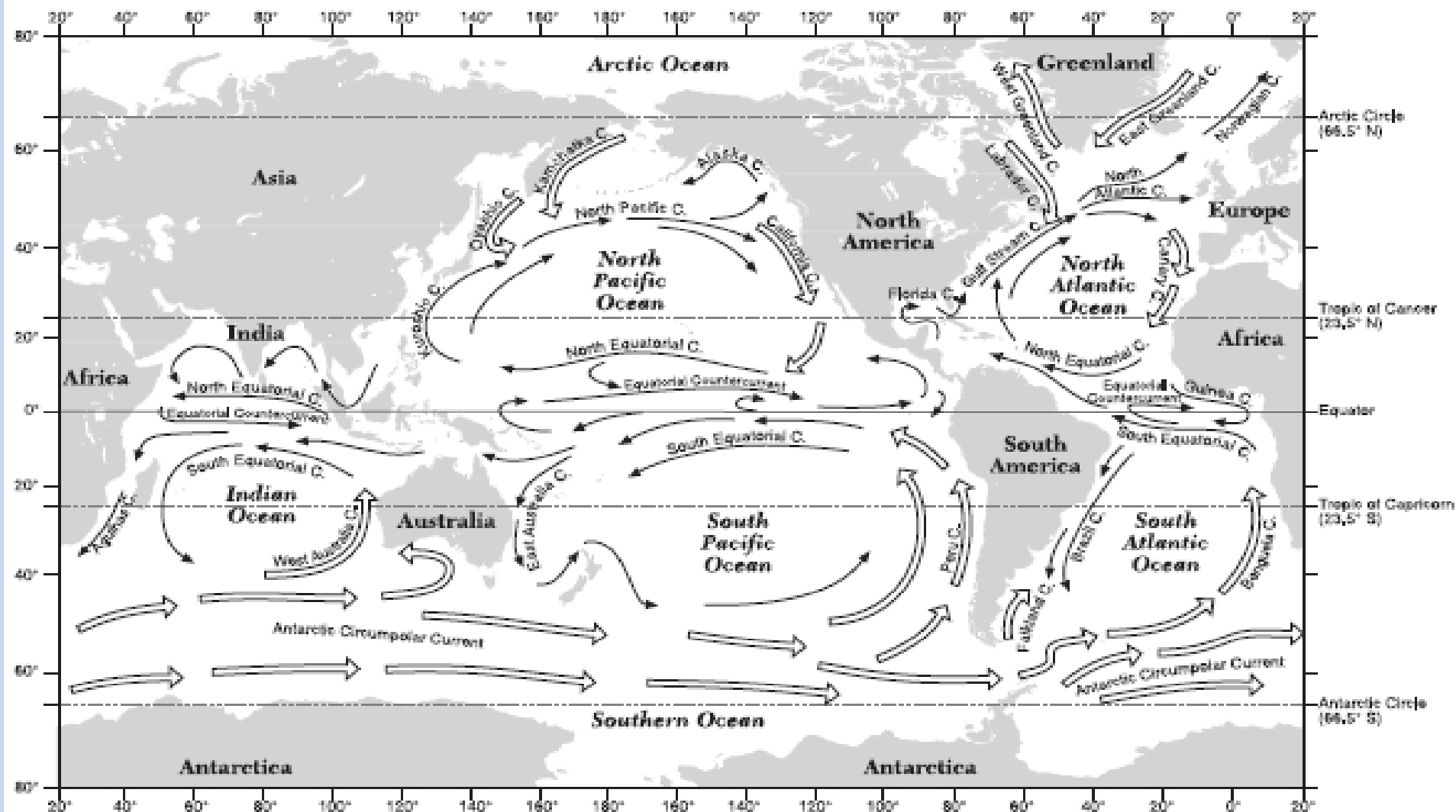
7. Surface Ocean Currents-

Page 4 in Earth Science Reference Table

a. Cold currents make areas colder.

b. Warm currents make areas warmer.

Surface Ocean Currents



NOTE: Not all surface ocean currents are shown.

Key	
	Warm currents
	Cool currents

Climate Types:

<u>P/Ep Ratio</u>	<u>Climate Type</u>
Less Than .4	Arid
0.4 - 0.8	Semiarid
0.9 - 1.2	Subhumid
Greater Than 1.2	Humid