

Lesson 5 - Factors affecting Temperature and Precipitation

The temperature of an area can be affected by 3 main factors

1. Latitude (has the biggest influence)
2. Nearness to Large bodies of Water
3. Elevation

1. How Latitude affects Temperature

Latitude affects temperature due to two main factors

- a. Angle of Inclination
- b. Angle of Incidence

a. Angle of Inclination:

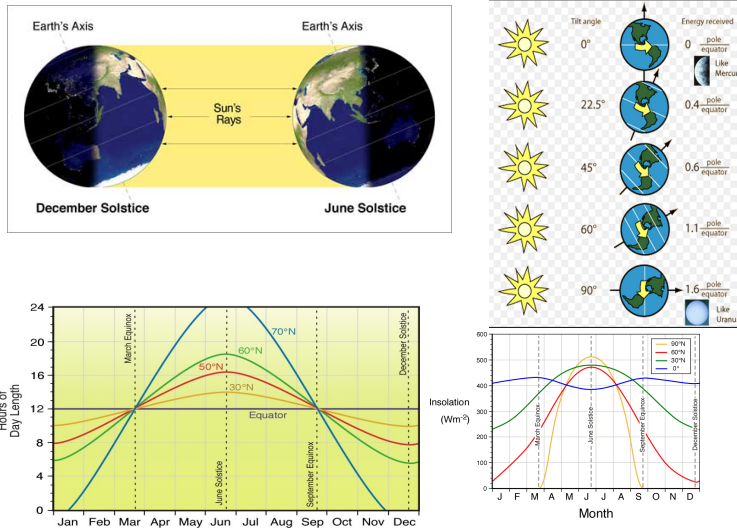
http://highered.mheducation.com/sites/007299181x/student_view0/chapter2/seasons_interactive.html

- Define angle of inclination.
 - o The degree by which Earth's poles are tilted from the perpendicular of the plane of its orbit
 - o Angle that the earth is tilted on its axis
- Earth has an angle of inclination of 23.5°.
- Earth orbits the Sun once per year.
- Why do the North and South Hemispheres receive different amounts of insolation at the same time of year?
 - o During May-Sept. the N. Hemisphere is angled more to the sun
 - o During May-Sept. the S. Hemisphere is angled away from the sun
 - o This is opposite from Oct.-March

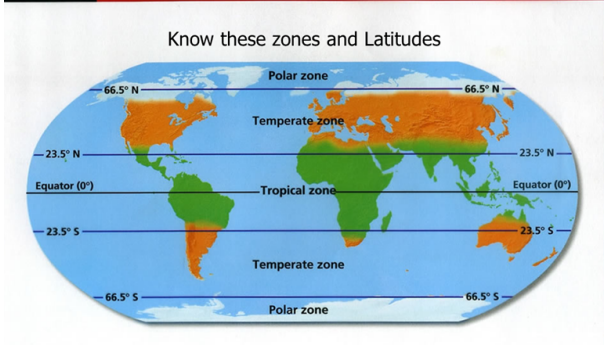
- Define Solstice. When does the solstice occur?
 - o One of the two points in Earth's orbit when the poles are the most tilted toward or away from the sun
 - o Summer solstice – June 21-22 – longest day of year (N.Hemisphere)
 - o Winter Solstice – Dec. 21-22 – shortest day of year (N. Hemisphere)

- Define equinox. When does the equinox occur?
 - o Point in earth's orbit when number of daylight hours equals night time hours
 - o Occurs on March 21-22 and Sept. 22-23

- How does the angle of inclination of the earth affect the temperature of a location?



6.95 World Temperature Zones



b. Angle of Incidence: pg. 359 -361

- Define angle of incidence.

o **Angle between a ray falling on a surface and the line of the perpendicular to that surface.**

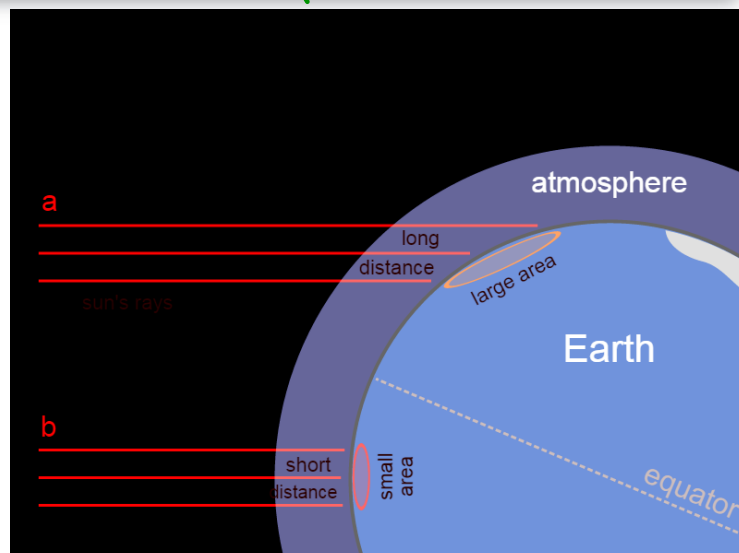
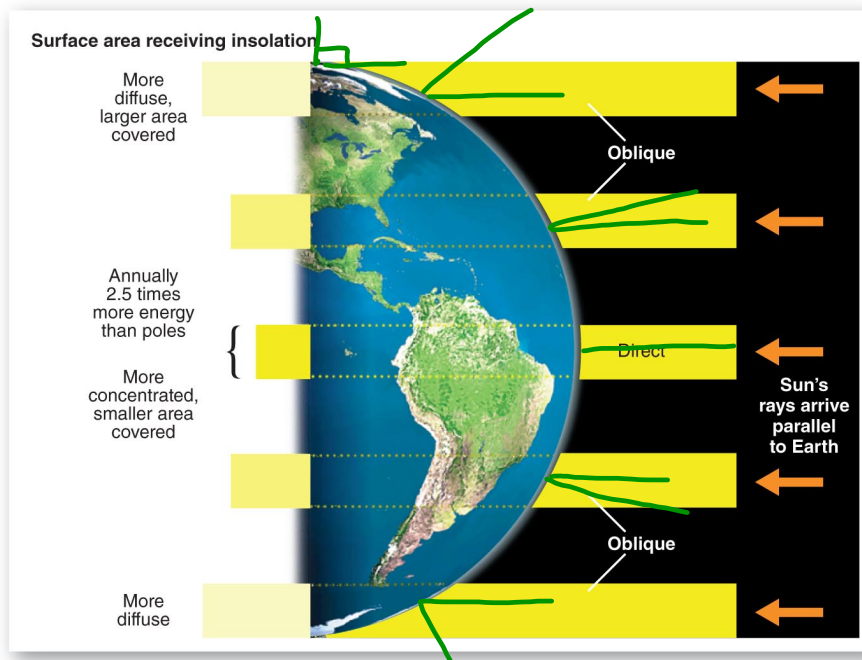
- The angle of incidence at the equator is 0° (degrees).

- The angle of incidence as you move away from the equator gets larger. How does the amount of insolation an area receives change as the angle of incidence gets larger?

o **As angle of incidence gets larger, amount of insolation becomes less.**

- Polar areas receive less solar energy per square kilometer than areas at or near the equator. Use this to explain why temperatures further north or south of the equator are always less than the equator.

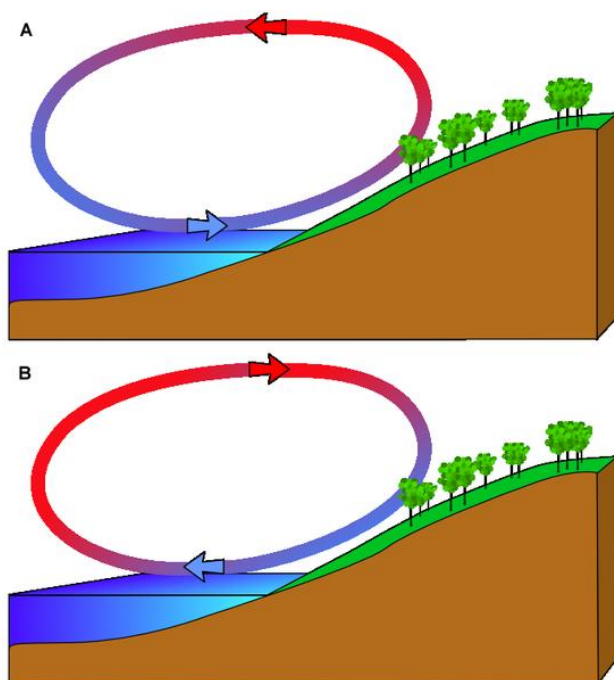
- **If less solar energy falls on an area this means the air and ground will absorb less energy and it will be cooler as a result**



2. How large bodies of water affect temperature?

- Water has a high specific heat capacity
 - This means it can absorb a large amount of energy without undergoing very much of a temperature change
 - This allows water to store and release energy
- When a location has a large water body near it;
 - during months of high insolation the water body absorbs large amounts of solar energy, preventing that solar energy from warming the air around it
 - during months of low insolation, the water body releases the stored energy and warms the air around it

<https://www.youtube.com/watch?v=YxqcGWvMaUQ>



3. How does elevation affect temperature?

<https://www.youtube.com/watch?v=cimglhtN-AU>



- As you increase in elevation (altitude), the temperature of the air decreases

Factors that affect Precipitation

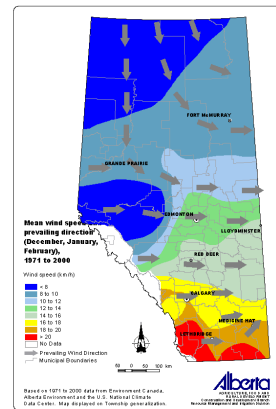
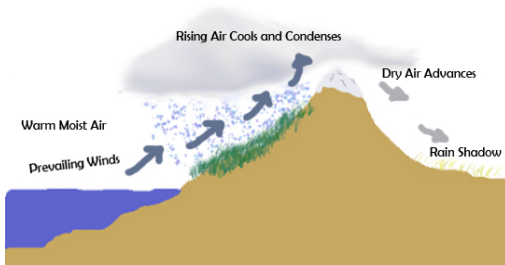
- Humidity is the amount of water vapor in the air.
 - This is produced by the evaporation of water from oceans, lakes, rivers, wetlands and plants.
- When water vapor in the air cools, it condenses. In other words, it becomes liquid and forms little drops. These droplets form clouds.
 - When the droplets are small, they remain suspended in the atmosphere. But they often become colder and their size and weight increases. When they become too heavy to remain suspended in the air, they fall to the Earth's surface. We call this **precipitation**, which may be rain, snow or hail.



Two main factors affect how much moisture an area receives:

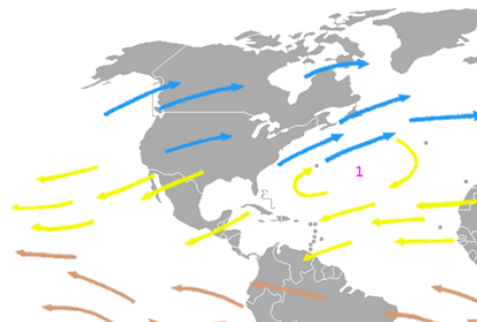
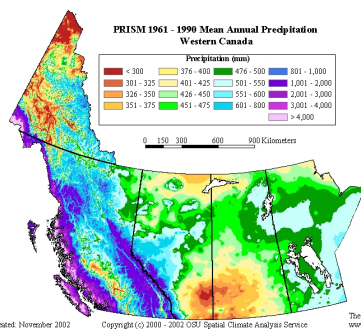
1. Location relative to mountain ranges

- There are 2 sides of a mountain
 - **windward side** - side the prevailing wind hits first
 - **Prevailing wind** - winds that blow predominantly from a single general direction
 - **leeward side** - side sheltered from the wind (opposite of windward)
- Mountain ranges force air to rise and cool
 - Cool air holds less moisture than warm air
 - Therefore when the air rises, it drops its moisture in the form of rain or snow



2. Location relative to large bodies of water

- Large bodies of water lose lots of water into the air when evaporation occurs
- This water vapor then moves inland
 - Therefore, areas close to a large body of water will get more rain/snow than areas far from a large body of water



Map Created: November 2002 Copyright (c) 2004 - 2002 CSRS Spatial Climate Analysis Service The Climate Source, Inc. www.climate-source.com

Practice Questions

1. Using your knowledge gained in this lesson answer the following questions using the diagram to the right. Support your answers

a. Which city probably has the same type of weather year round? Why? Use an atlas to find a similar city in Canada.

b. What factor would cause location F to have a colder yearly climate than any other location?

c. What 3 factors would cause location E to have the greatest annual rainfall?

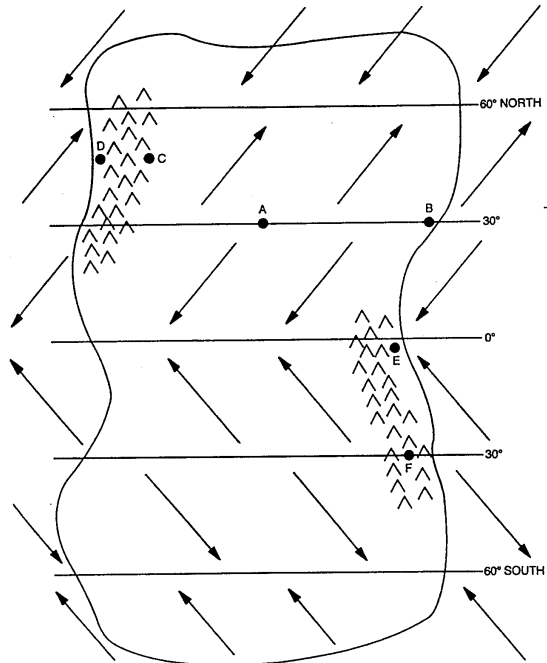
d. Which location, C or D, would you expect to have the greater annual rainfall?

e. Which location, A or B, would you expect to have the greater range in temperature during the year? Explain

f. On June 21st, which city would have the coolest temperature? Explain

g. On Canada Day, which city would experience the biggest range in temperature between day and night? Explain

Diagram of Imaginary Continent on Earth



The diagram below shows the Earth's position in its orbit on four different dates. On the solid line label the equinox dates. On the dotted lines name the season for the Northern Hemisphere.

