Global Weather 5

**Outcome: (116-1), (117-10)**

# Content: Page 220-221

### **Weather vs. Climate:**

#### **Weather:**

* Weather describes what is happening outdoors when you **look out the window.**
* Weather is the **atmospheric conditions** that happen from minute to minute.
* The weather can change a lot within a very **short time**.
* For example, it may rain for an hour and then become sunny and clear.
* Weather includes **daily changes** in precipitation, barometric pressure, temperature, and wind conditions for your area

#### **Climate:**

* Climate is the **expected weather conditions** for your area during different times of the year.
* Climate data is based on a 30-year average, which includes **average weather conditions**, regular weather patterns (like winter, spring, summer, and fall), and special weather events (like tornadoes and floods).
* Climate tells us what it's **usually like in the place where you live** at different times of the year.
* Climate data includes information such as; precipitation, temperature, humidity, sunshine, wind velocity and direction, fog, frost, and other distinct conditions for a specific area.

### **Factors Affecting Climate:**

* The climate you receive depends entirely on where you live.

##### **Latitude**

* Latitude measures the **distance north or south** from the equator.
* The equator receives more **sunlight** than anywhere else on earth.
* The further you move away from the equator the sun becomes less direct, therefore, when you move toward the north and south poles **climates tend to get cooler**.

#### **Ocean currents**

* + Ocean currents can greatly affect temperatures and weather conditions.
  + Two main ocean currents affect Newfoundland and Labrador; the **Gulf Stream** (Warm) and the **Labrador Current** (Cold).
  + What will happen when the warm moist air of the Gulf Stream passes over the cold water of the Labrador Current?
    1. **FOG**

**3. Wind and air masses**

* + Winds that blow from the sea often bring rain to the coast because an **air mass picks up moisture as it moves over water**
  + The winds blowing over the cold ocean water in summer tends to **cool the summer air**.
  + During the winter the oceans are generally warmer than the winds so the winter air becomes **mild and wet** as it blows over the ocean.

#### **Elevation**

* Elevation measures how high you are **above sea level**.
* As you rise, **the air cools**. In fact the air cools by 6.5oC for every kilometer (1000m) you rise.
* The higher the place is above sea level the **colder it will be**.
* This happens because as altitude increases, air becomes thinner and is less able to absorb and hold heat.
* This is also why you often see snow on the **top of mountains** all year round.

#### **Relief (Steepness)**

* Mountains receive **more rainfall** than low-lying areas because the temperature on top of mountains is **lower** than the temperature at sea level due to the elevation.
* As the warm moist wind blows into the mountainous barrier (windward side) the **air is forced to rise**.
* As the air rises it cools and begins to **release its moisture as clouds**.
* As the air continues to rise and cool **heavy rain develops**.
* When the air goes over the mountain and begins to fall (leeward side) the air becomes **drier and warmer**.
* So the amount of precipitation and the temperature depends **which way the wind is blowing and what side of the mountain you are on!**

#### **Closeness to water.**

* If you live close to a large body of water like the ocean or a large lake, climate is affected.
* Coastal areas are cooler and wetter than inland areas since wind blowing over the water picks up moisture and is **cooled by the body of water.**
* In Newfoundland you may have noticed that inland communities like Gander and Grand Falls have much **warmer summer time temperatures** than areas out around the coast.
* However, in winter, the ocean warms the coastal air so the coastal areas have **slightly warmer winter temperatures** than central areas.

#### **Human activities**

* Human activities are now beginning to influence local climates as well as the global climate.
* Southern Ontario (places like Toronto) now includes **smog as part of the climate data** for spring and summer.
* The excessive pollution from cars and industry, high temperatures and high humidity combine to produce an **unhealthy atmosphere**.
* The burning of fossil fuels in cars, industry and home heating is accused of causing **global climate change**.
* Global warming is supposed to be responsible for **variations in climates and increased amounts of severe weather** in just about every part of the world.

**Outcome: (115-2), (331-2)**

# Content: Page 222-225

## The Atmosphere:

* The **thin layer of gases** that surround the earth
* The atmosphere is where all the **weather** happens.
* The atmosphere acts like a blanket, which controls the **temperature** of the earth.
* If there were no atmosphere, the **temperature would change dramatically.** 
  + In the day, on the light side the temperature would be hot enough to boil water but at night on the dark side the temperature drops to -150oC

#### **What is the earth's atmosphere made of?**

* The earth's atmosphere is a made up of **dust and a mixture of invisible gases.**
* Some of these gases include:

|  |  |
| --- | --- |
| **Gas** | **Amount** |
| Nitrogen (N2) | 78% |
| Oxygen (O2) | 21% |
| Other gases:   * Water vapour, argon, carbon dioxide, neon, helium, krypton, hydrogen, ozone,... | 1% combined |

##### **Some of these gases have very important roles in the atmosphere.**

* Nitrogen and ozone act as a protection shield that blocks out **harmful radiation from space.**
* Oxygen is essential for life.  **Plants produce oxygen** and we breathe it in.
* Carbon dioxide is essential for life too.  We breathe out carbon dioxide and **plants breath it in**.
* Water vapour is essential to the water cycle and **weather patterns**.  Water vapour is responsible for clouds, fog, rain and snow.

#### **Layers of the atmosphere:**

* The farther we travel from the earth **the thinner** the atmosphere gets.
* About 99% of the mass of the atmosphere is below 30 km but has been measured to a height of 1000km.
* The layers of the atmosphere are classified based on their **temperature.**

##### **Troposphere**

* + We live in the troposphere and this is where all the **weather happens**.
  + This layer is the closest to the earth, which means the troposphere gets **heated** the most.
  + This heating causes **air currents** and cloud formation.
  + Also, all the dust of the atmosphere is in the troposphere.
  + Water vapour condenses on the dust particles to create **clouds and rain**.
  + The troposphere goes from the ground to about 16 km up.

##### **Stratosphere**

* + The stratosphere rises from 15 km to 50 km.
  + The stratosphere has **very little amounts of water vapour** but ice crystals have been seen to form at this high altitude.
  + The major gas of the stratosphere is **ozone**.
  + This layer is cooler than the troposphere
  + The ozone layer blocks out **radiation** from space.
  + Some of the energy of ultraviolet (UV) light being blocked gets transferred to the ozone layer.
  + **Jet streams** form between the troposphere and the stratosphere.
  + There is not enough oxygen in the stratosphere to keep you alive.  This is why the pilots of high-level aircraft need to breath oxygen from masks.

##### **Mesosphere**

* + The mesosphere has **very little atmosphere** and ranging in altitude from 50 to 80 km.
  + The temperature of the mesosphere goes as low as -80oC!
  + This is the layer of the atmosphere where **meteorites burn up!** (Shooting stars!)

##### **Thermosphere**

* + The atmosphere in the thermosphere is very, very **thin.**
  + It is so thin that as the sun's energy hits so few molecules of air we begin to see **extreme heating**.
  + However, because there are so very few molecules the energy doesn't get transferred to other layers.

### **Atmospheric Pressure:**

#### **Air density:**

* The atmosphere is made up of gases.
* If we warm up these molecules of gas they begin to **move faster**.
* The faster they move the more space they want to occupy, that is, the warmed gas molecules **spread out**.
* If we had this air in a container with a small hole in it some of the gas would escape and the container with the gas would get lighter then before (**less dense**).
* HOT is **LIGHTER**
* If we cooled down the air the molecules of gas would begin to **slow down.**
* When molecules slow down they need less space and begin to move closer together (contract).
* For the same container above, the gas inside would begin to **contract** and now air from the outside will move in to fill up the container.
* The container with the gas will now be heavier then before (**denser**).
* COLD is **HEAVY**

#### **Air pressure:**

* **Gravity** pulls down on all matter.
* Gases are matter and gravity pulls down on them.
* This is why the **troposphere** (layer closest to the earth) has 99% of all the gases in the atmosphere.
* As these gas molecules are being pulled down they are colliding, pushing and bumping into everything else on the surface of the earth, including you.
* All this bumping and pushing creates what we call **air pressure**.
* Have you ever put your hand out the window while you were driving in a car?  That's air pressure - you are feeling the force of the air colliding with your hand!

**Homework: page 225: #’s 2, 4**

