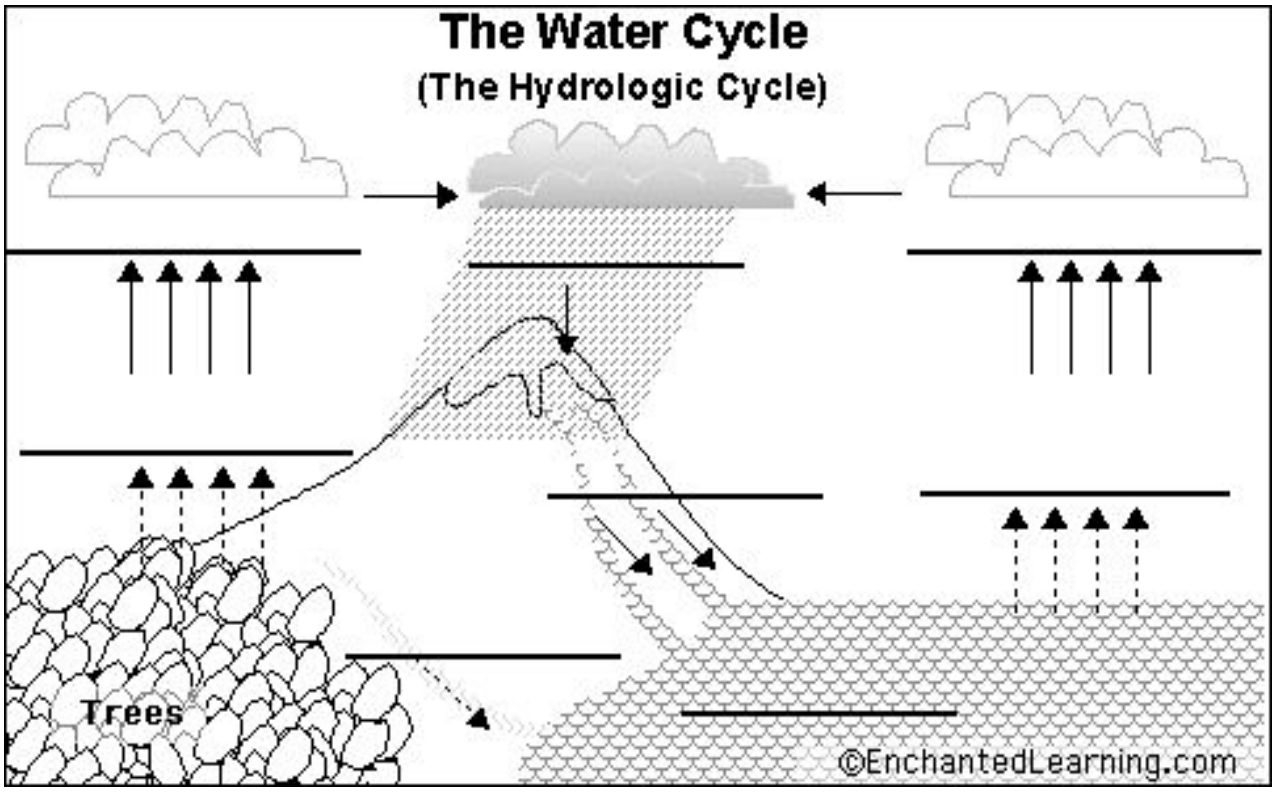
Unit 6 -The Hydrosphere (**=tested items)

Distribution of Water On Earth

- 71% of Earth is water
  - 97% in the oceans
  - 3% is freshwater
    - 2% in ice and glaciers
    - 0.6% in underground water
    - 0.4% in rivers, streams, lake and atmosphere

****The Water Cycle**-----Water is constantly moving among the oceans, the atmosphere, the solid earth and biosphere

**Parts of the Water Cycle



A. **Evaporation**: liquid water changes into water vapor
B. **Precipitation**: liquid or solid water from the clouds
C. **Condensation**: water vapor that turns into liquid making clouds
D. **Infiltration**: liquid water moving through the ground
E. **Transpiration**: water vapor released to the air by plants
F. **Runoff**: when liquid hit the ground but not absorbed

****What does Water Balance Mean?**---- Precipitation equals evaporation

**How is Water Used?

- 70% in Irrigation
- 20% in Industries
- 10% in Cities and Residences

Ocean Currents --- Is the mass of ocean water that flows from one place to another

****How do Currents Influence Climate?**

- Exchanges heat in the water with the atmosphere
- Type of current nearby influences weather for an areas
  - Warm currents bring warm temperatures
  - Cold currents bring cooler temperatures

****Current Movement**

Warm Currents	Cold Currents
– Move from the tropics to the poles – Ex: Gulf Stream (east coast of the US)	– Move from the poles to the equators – Ex: Canary Current

****Why do Current Moves?**

Primary Forces	Secondary Forces
– Solar heating, winds, gravity, Coriolis	– Influences where the current flows

Freshwater Facts

- Primary use for freshwater in U.S. is for agriculture
- In our homes, we use the most freshwater to wash, clean and flush.
- The typical person in an industrialized nation uses 700-1000 gallons of freshwater per week

****What is Groundwater?**

- Water that is below the surface
- 50% of water used by the public is groundwater

****How does water become Groundwater?**

- **Permeability**
  - How easily water can pass through connected pore spaces
- **Porosity**
  - Percentage of pore spaces in soil and rock
  - Clay has the smallest percentage (not permeable)

****Aquifers**----Underground layer of water bearing permeable rock (gravel, sand or silt) from which ground water can be extracted using a well

****Wells**

- A hole bored into the zone of saturation
- Pumping can cause the water table to be lowered
- **Artesian Well**----Groundwater rises on its own under pressure
- **Cone of depression** --- Occurs in an aquifer when a lot of groundwater is pumped from the well

**Problems with Groundwater

- Withdrawing water for agriculture
- Toxic metals contaminating the water (arsenic, cadmium, lead)
- Salt water intrusion
  - Salt water from the ocean enters the groundwater near coastal areas

**What is a Flood?

- When the stream or river overloads the capacity of its channel and overflows it banks
- Most floods are caused by rapid spring snow melting or storms that bring heavy rains over a large region

**How to control Floods?

- **Artificial Levees**
  - Concrete or Earthen mounds built on the banks of a river
  - Increases the amount of water it can hold
- **Natural Levees**
  - Parallels a stream and helps to contain its water, except during flood stage
- **Flood-Control Dams**
  - Stores floodwater and lets it out slowly
- **Limit Development**
  - Preserve floodplains instead of building on them

Human Activities Causing Flooding

- Removing vegetation
- Overgrazing
- Mining
- Building on floodplains
- Logging
- Forest fire
- Destruction of wetlands
- Urbanization

**Types of Water Pollution

- **Oxygen Demanding Agents**
  - Organic waste and manure
- **Toxic Metals**
  - Acids, arsenic, lead
- **Inorganic Plant Nutrients**
  - Nitrogen and phosphorus
- **Organic Chemicals**
  - Oil, detergents, pesticides
- **Sediment**
  - Erosion and soil

**Oxygen Demanding Agents

- Oxygen is removed from water by bacteria (B.O.D)
- Fish can't live in streams without oxygen

**B.O.D Effect on Water Quality

- All streams have the ability to breakdown organic waste
- Problem is when a stream is overloaded with organic waste

Toxic Metals

- Toxic metals leaches into the water
- Ex.----Arsenic, Lead, Mercury and Cadmium

Inorganic Plant Nutrients

- Sources
  - Human, animals and industrial waste
  - Excessive use of fertilizers for crops, lawns and homes

Sediment

- #1 source of water pollution
- Clouds the water
- Blocks sunlight for the aquatic plants

**Drinking Water Quality

- Drinking water is by
  - Storage in reservoirs (suspended matter settles
  - Treated by sand filters
  - Activated charcoal
  - Addition of chlorine

**Sewage or Wastewater

- Composed of sewage and wastewater from
  - Used water and toilets
  - Industries

**Wastewater Treatment

- **Wastewater Treatment Plants**
  - Treat large volumes of municipal or industrial waste
- **Septic Tanks**
  - Treat small volumes of waste, no chlorine used

**Protecting The Water

- **Clean Water Act (1972)**
  - Regulates the discharge of pollutants in the US river and streams
- **Safe Drinking Water Act (1974)**
  - Protect the quality of drinking water
  - Water treatment plants
  - Well water

**Water Conservation Methods

- Repair leaking faucets and pipes
- Landscape using plants requiring little water
- Use drip irrigation
- Use water saving appliances
- Purify and reuse water