Chapter 3 Notes

Section 3 – The Hydrosphere and Geosphere

Objectives

- **Name** the three major processes in the water cycle.
- **Describe** the properties of ocean water.
- **Describe** the two types of ocean currents.
- **Explain** how the ocean regulates Earth's temperature.
- **Discuss** the factors that confine life to the biosphere.
- **Explain** the difference between open and closed systems.

The Hydrosphere

- The **hydrosphere** includes all of the water on or near the Earth's surface.
- This includes water in the oceans, lakes, rivers, _____, polar ice caps, _____, rock layers beneath Earth's surface, and _____.

The Water Cycle

- The **water cycle** is the _____ movement of water from the ocean to the _____ to the land and back to the _____.
- **_____** is the change of a substance from a liquid to a gas.
- Water continually evaporates from the Earth's oceans, lakes, streams, and soil, but the majority evaporates from the oceans.
- **_____** is the change of state from a gas to a liquid.
- Water vapor forms water droplets on _____ particles which then form clouds in which the droplets collide to create larger, heavier drops that then fall from the clouds as rain.
- **_____** is any form of water that falls to the Earth's surface from the clouds, and includes rain, snow, sleet, and hail.

Earth's Oceans

- All of the oceans are joined in a single large _____ body of water called the world ocean. The world oceans play important roles in the _____ of the planet's environment.
- The largest ocean on Earth is the _____ Ocean with a surface area of about 165,640,000 km^2.
- The deepest point on the ocean floor, the _____, is found in the Pacific Ocean.
- The Challenger Deep is located east of the _____ islands at the bottom of the _____ Trench and is 11,033m below sea level which is deeper than _____ is tall.
- Oceanographers often divide the Pacific Ocean into the North Pacific and South Pacific based on

the direction of the _____ flow in each half of the Pacific Ocean.

- Surface currents in the Pacific move in a _____ direction north of the equator.
- Surface currents in the Pacific move in a counter-clockwise direction south of the equator.

- The second largest ocean on Earth is the _____ Ocean, and covers about half the area of the Pacific Ocean which is a surface area of about 81,630,000 km^2.
- Like the Pacific Ocean, the Atlantic Ocean can be divided into a north and south half based on the directions of surface current flow north and south of the equator.
- The Indian Ocean is the third largest ocean on Earth with a surface area of 73,420,000 km^2.

- The smallest ocean is the _____ Ocean which covers 14,350,000 km^2.
- The Arctic Ocean is unique because much of its surface is covered by floating ice, called

  _____, which forms when either waves or wind drive together frozen seawater, known as sea ice, into a large mass.

Ocean Water

- The difference between ocean water and fresh water is that ocean water contains more _____.

- _____ is a measure of the amount of dissolved salts in a given amount of liquid.

- Salinity is lower in places that get a lot of _____ or in places where fresh water _____ in

  to the sea. In contrast, salinity is _____ where water evaporates rapidly and leaves the salts behind.

- Most of the salt in the ocean is _____, which is made up of the elements sodium and chloride, although many other elements can be found in the ocean as well.

Temperature Zones

- The surface of the ocean is _____ by the sun, while the depths of the ocean, where

  _____ never reaches, are very cold, just above _____.

- Surface waters are stirred up by waves and currents so the warm surface zone may be as much as

  _____ m deep.

- Below the surface zone is the _____, which is a layer about 300 to 700 m deep where the temperature falls rapidly.
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A Global Temperature Regulator

- One of the most important functions of the world ocean is to absorb and store _____ from

  sunlight which in turn regulates _____ in Earth's atmosphere.

- Because the ocean both absorbs and releases heat slower than _____, the temperature of the

  atmosphere changes more _____.

- If the ocean did not regulate atmospheric and surface temperatures, temperatures would be _____ for life to exist on Earth.
- Local temperatures in different areas of the planet are also regulated by the world ocean.
- Currents circulate warm water causing land areas they flow past to have more _____ climates.
- For example, the British Isles are warmed by the waters of the _____.

Ocean Currents

- Streamlike movements of water that occur at or near the surface of the ocean are called **surface currents**.
- Surface currents are _____ driven and result from global wind patterns.
- Surface currents can be warm or cold water currents. However, currents of warm water and currents of cold water do not readily _____ with one another.
- **Deep currents** are streamlike movements of water that flow very slowly along the ocean floor.
- Deep currents form when the cold, _____ water from the poles sinks below warmer, less dense ocean water and flows toward the _____.
- The densest and coldest ocean water is located off the coast of _____ and flows very slowly northward producing a deep current called the Antarctic Bottom Water.

Fresh Water and River Systems

- **Fresh water** is water that contains _____ amounts of salts.
- Most of the fresh water is locked up in icecaps and _____ while the rest is found in places like lakes, rivers, wetlands, the soil and atmosphere.
- A _____ system is a network of streams that _____ an area of land and contains all of the land drained by a river including the main river and all its smaller streams or rivers that flow into larger ones, or tributaries.

Ground water

- Rain and melting snow _____ into the _____ and _____ off the land. Most of this water trickles down through the ground and collects as _____.
- Although it makes up only ____ percent of all the water on Earth, groundwater fulfills the human need for fresh drinking water, and supplies agricultural and industrial need.

Aquifers

- A _____ that stores and allows the flow of groundwater is called an aquifer.

The Biosphere

- The **biosphere** is the part of Earth where life exists, extending about ____ km into the ocean and about ___ km into the atmosphere.
- The materials that organisms require must be continually _____. _____ allows a planet to maintain an atmosphere and to cycle materials.
- Suitable combinations that organisms need to survive are found only in the biosphere.
- The biosphere is located near Earth's surface because most of the _____ is available near the surface.
- Plants need sunlight to produce their food, and almost every other organism gets its food from _____ and _____.
- Most of the algae float at the surface of the ocean and is known as _____.

Energy Flow in the Biosphere

- The energy used by organisms must be obtained in the biosphere and must be _____ supplied for life to continue.
- When an organism dies, its body is broken down and the _____ in it become available for use by other organisms.
- This flow of _____ allows life on Earth to continue to exist.
- **Closed systems** are systems that cannot _____ matter or energy with its surroundings.
- **Open systems** are systems that can exchange both matter and energy with its surroundings.
- Today, the Earth is essentially a closed system with respect to _____, but an open system for energy as energy travels from _____ to _____ which is eaten by other animals. In the process, some energy is lost as _____ to the environment.