Chapter 3 Review ~ Chemical and Physical Features of the World Ocean

This chapter presents four aspects of the marine environment:

1. the chemical nature of pure water
2. the nature of sea water and its effects on temperature, density, light, etc.
3. oceanic movements: currents, waves & tides
4. the stratification of the ocean into three distinct layers

You should be familiar with the basic ideas of chemistry as it pertains to water:

- substances are made of **atoms**
- atoms combine to make **molecules**
- water molecules are made of two hydrogen atoms and one oxygen atom (H_2O)
- water molecules have polarized electrical charges
- **the polar nature of water makes water 'sticky';** water molecules form **hydrogen**
  - **bonds** with other water molecules and with other substances

Be able to describe the importance of water to moderating the temperatures of individuals and the entire planet.

- Why does water have a high **heat capacity** and what does this mean?
- What role does **evaporation** play in moderating temperatures?
- What **special properties of ice** protect marine organisms?
- Water is also critical to life as a **solvent**. Explain.

- What is the average salinity of seawater?
- What effects salinity?
- What are the two major solutes found in seawater?
- What is the '**Rule of Constant Proportions**?'

- Be able to describe one method for sampling water at different depths. What is the relationship between temperature, salinity and density of seawater?

- Be able to describe the effect of seawater on light (transparency) and pressure. How do these conditions vary with depth?

- Be able to define and describe the relationships between the **Coriolis effect**, wind patterns and surface currents in the ocean. What are **ocean gyres**?

- Which areas of the ocean tend to be warmer – eastern or western? Explain.

- What is a **wave**? Be able to describe the motion of a wave, the movement of water particles within a wave, and why a wave **breaks** and forms **surf**.

- What are **tsunamis**? What was the cause of the tsunami of 2004?

- What are **tides**? Explain the relative effect of the moon and sun on the tides.
- When do high tides occur, when do low tides occur, and how long between high tides?

- What are **neap tides** and **spring tides**?
- How do these vary with the lunar cycle? What is **tidal range**?

- The ocean is typically **stratified** into layers: **surface layer, intermediate layer,** and the **deep and bottom layers** (these last two are usually combined, why?). Be able to describe the physical characteristics of these layers in terms of temperature and density.
- Which of these layers is least stable?
- What is the relationship of these layers to the **photic zones** (euphotic, photic, aphotic)? Compare these layers between the tropics and temperate zones.

- What is the **great ocean conveyor**?

Other terms to be able to define, describe or use:

~ density	~ specific gravity	~ salinity (ppt)	~ dissolved gases
~ trade winds	~ equatorial	~ gyre	~ wave crest
~ wavelength	~ period	~ fetch	~ trough
~ thermocline	~ overturn	~ mixed layer	~ El Nino