Topic/Objectives: 4-3 Thermohaline Circulation; (1) Explain how temperature varies with depth in the ocean, (2) Explain how temperature and salinity cause deep ocean circulation, (3) Relate how ocean circulation impacts life in the ocean	**Name:** **Date:** **Period:**
Essential Question: How does ocean temperature and salinity affect ocean currents?	

Questions:	**Notes:**
	Three Layer Ocean ◦ _____ _____ is normally cold and dense, whereas the surface water is relatively warm and less dense. ◦ The _____ _____ (100 – 200 m) is mixed by wind, waves and current, so it is also known as the mixed layer. At times the surface layer is not mixed well. ◦ The permanent _____, a transition zone between warm surface water and cold water below, defines the intermediate layer (1,000 – 1,500 m). ◦ Technically, deep water and _____ _____ are different, but they are similar in being uniformly cold, typically less than 4°C.
	Stability ◦ Most of the time surface water, being warmer and less dense, floats on top of the denser water below, unless wind or wave energy stirs up the water column. This type of water column is said to be _____. ◦ How stable the water column is depends on the _____ difference between the layers.
	Overturn ◦ Sometimes water columns become _____, meaning that the surface water becomes denser than the water below. The surface water sinks and mixes with deeper water. This process is called _____. ◦ Overturn follows a regular _____ pattern in temperate and polar regions, usually occurring in the winter when surface water cools. ◦ If surface water gets cold enough during the winter, it becomes denser than the deeper water and sinks, which is called _____. ◦ Oceanographers use the characteristic combination of _____ and _____ to follow the movement of water masses over great distances. ◦ This form of circulation is driven by changes in _____, which in turn is determined by temperature and salinity. ◦ This form of circulation is known as _____ _____.

The Great Ocean Conveyor

- After water masses leave the surface, they sink to a depth determined by their _____.
- To sink to the bottom, surface water must be very dense—cold and salty.
- Cold, salty water is usually the result of the formation of _____ _____.
- The main places where surface _____ reaches the bottom are the Atlantic Ocean, south of Greenland, and just north of Antarctica.
- The water masses that originate in these locations sink and spread along the seafloor, forming the _____ _____ _____ _____ and the _____ _____ _____.
- This global thermohaline circulation, called the _____ _____ _____ mixes the oceans on a timescale of 1,000 years.
- The great ocean conveyor also regulates Earth's _____ and brings dissolved _____ to the deep sea.
- The great ocean conveyor varies in strength and exact position in a series of superimposed cycles, or _____.

Summary: