Water Questions!!! Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Ocean Acidification – National Geographic**For tens of millions of years, Earth's oceans have maintained a relatively stable acidity level. It's within this steady environment that the rich and varied web of life in today's seas has arisen and flourished. But research shows that this ancient balance is being undone by a recent and rapid drop in surface pH that could have devastating global consequences.

Since the beginning of the industrial revolution in the early 1800s, fossil fuel-powered machines have driven an unprecedented burst of human industry and advancement. The unfortunate consequence, however, has been the emission of billions of tons of carbon dioxide (CO2) and other greenhouse gases into Earth's atmosphere.

Scientists now know that about half of this anthropogenic, or man-made, CO2 has been absorbed over time by the oceans. This has benefited us by slowing the climate change these emissions would have instigated if they had remained in the air. But relatively new research is finding that the introduction of massive amounts of CO2 into the seas is altering water chemistry and affecting the life cycles of many marine organisms, particularly those at the lower end of the food chain.

**Carbonic Acid**   
When carbon dioxide dissolves in this ocean, carbonic acid is formed. This leads to higher acidity, mainly near the surface, which has been proven to inhibit shell growth in marine animals and is suspected as a cause of reproductive disorders in some fish.

On the pH scale, which runs from 0 to 14, solutions with low numbers are considered acidic and those with higher numbers are basic. Seven is neutral. Over the past 300 million years, ocean pH has been slightly basic, averaging about 8.2. Today, it is around 8.1, a drop of 0.1 pH units, representing a 25-percent increase in acidity over the past two centuries.

**Carbon Storehouse**  
The oceans currently absorb about a third of human-created CO2 emissions, roughly 22 million tons a day. Projections based on these numbers show that by the end of this century, continued emissions could reduce ocean pH by another 0.5 units. Shell-forming animals including corals, oysters, shrimp, lobster, many planktonic organisms, and even some fish species could be gravely affected.

Equally worrisome is the fact that as the oceans continue to absorb more CO2, their capacity as a carbon storehouse could diminish. That means more of the carbon dioxide we emit will remain in the atmosphere, further aggravating global climate change.

Scientific awareness of ocean acidification is relatively recent, and researchers are just beginning to study its effects on marine ecosystems. But all signs indicate that unless humans are able to control and eventually eliminate our fossil fuel emissions, ocean organisms will find themselves under increasing pressure to adapt to their habitat's changing chemistry or perish.

1. Describe the change in acidity scientists are concerned about.
2. What affects might this change have?

**Oceanography Q’s**

1. What is the source of cold water of Earth's oceans?

a. polar seas

b. equatorial seas

c. years with cold temperatures

d. years with long winters

2. What causes the air of a tropical storm to rotate?

a. supercells

b. the Coriolis effect

c. strong downbursts

d. funnel clouds

3. What geologic process released large amounts of water vapor into Earth's early atmosphere?

a. melting of glacial ice

b. movement of ocean currents

c. volcanic eruptions

d. precipitation as ice, water, or snow

4. How are seas different from oceans?

a. Seas are smaller and mostly landlocked.

b. Seas support a wider variety of marine life.

c. Seas are larger.

d. Seas are deeper and in lower latitudes.

5. Which salt is the most abundant in sea water?

a. sodium chloride

b. magnesium chloride

c. sodium sulfate

d. potassium bromide

6. What is the thermocline?

a. a transitional layer in the ocean where temperature decreases rapidly with depth

b. a change in salinity with depth

c. a layer of cold water in the ocean

d. the formation of cold water coming from Antarctica

7. What is the average salinity of ocean water?

a. 35 ppt

b. 37 percent

c. 45 ppt

d. 35 percent

8. What is the cause of ocean layering?

a. polar ice caps

b. evaporation

c. currents

d. density differences

9. What is the densest and coldest water mass of all Earth's oceans?

a. Antarctic bottom water

b. Gulf Stream

c. Antarctic intermediate water

d. North Atlantic deep water

10. The density of seawater is dependent on \_\_\_\_\_\_\_\_\_\_.

a. temperature and currents

b. salinity only

c. temperature only

d. salinity and temperature

11. Discuss the origin and composition of the oceans.

12. Explain ocean layering.

13. Why is a thermocline absent at high latitudes?

14. Explain the factors affecting the salinity of the ocean.

**Local Water Q’s – INVESTIGATE!!!! (due March 30th)**

1. Where does water enter the geosphere in our area?
2. Where is the water we drink treated?
3. How does the water get to our house?
4. Where does the water go after we use it?